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USSR Report

SCIENCE AND TECHNOLOGY POLICY

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INCENTIVES FOR NEW PRODUCTION DISCUSSED

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA EKONOMICHESKAYA in Russian No 4, Apr 83 pp 37-46

[Article by A.S. Kolesnikov and V.V. Starovit: "Problems in Stimulating the Production of New Output"]

[Text] This article contains an analysis of the practices used to stimulate the production of new output in our country and the other socialist countries. In order to improve these practices the authors suggest classifying inventions in three groups and establishing appropriate compensation on the basis of these groups.

An important reserve for increasing intensification and effectiveness in the economy lies in the acceleration of scientific-technical progress, and in the widespread and rapid production application of the achievements of science, technology and the best experience.

"If we truly want to advance the work of introducing new technology and new work methods," Comrade Yu.V. Andropov, general secretary of the CPSU Central Committee, said at the November (1982) Plenum, it is necessary for the central economic organs, the Academy of Sciences, the State Committee for Science and Technology and the ministries... to discover and eliminate the specific difficulties which are hindering scientific and technical progress. Methods of planning and the system of material incentives must help to bring science and production together. It is necessary to ensure that those who proceed boldly to introduce new technology do not end up in an unadvantageous position."

Implementation of the decisions contained in the 12 July 1979 decree of the CPSU Central Committee and the USSR Council of Ministers "Concerning the Improvement of Planning and the Strengthening of the Influence of the Economic Mechanism on the Raising of Production Effectiveness and the Quality of Work"

helps to provide effective stimulation for scientific-technical progress in industrial production. This decree specifically stipulates a measure aimed at improving sharply the quality of output: the supplement added to the wholesale price because of new, highly-effective output is increased 1.5-fold, as is the supplement for output which has been awarded the State Seal of Quality in those cases in which the production of this output is based on designs recognized through the established procedure as being discoveries or inventions.

Special incentives for introducing discoveries and inventions into production are being used for the first time in our country's economic management practices. At the present time the socialist countries have somewhat different methods for stimulating the introduction of inventions. For example, in the People's Republic of Bulgaria (since 1968) and in the CSSR (since 1972) an enterprise which has created and introduced an invention has the opportunity to recover some of its costs from other enterprises in the socialist sector which borrow the invention and the experience of its application.

The spread of this practice under Soviet conditions could have a favorable influence on the interest which enterprises show in the exchange of inventions, and it could reduce the risk and expense associated with their application. However, this kind of measure cannot solve all the problems of introducing inventions created in the sector scientific-research institutes and design bureaus, and especially in the science-intensive sectors, because it would not fit well into the mechanism of cost accounting relations in our country.

In the Hungarian Pecple's Republic (since 1969) and in the Polish People's Republic (since 1972) an invention has been assigned to a specific organization through the issuing of a patent; other organizations in the socialist sector can use this invention on a compensation basis, and the size of the payments for the introduction of this invention depends on the technical-economic effectiveness of its application. Patents (and not inventors' certificates, as are usual in the USSR) are issued for inventions in many socialist countries. For example, in the Socialist Republic of Rumania (SRR) a patent for an invention is issued to a sccialist organization, but this patent certifies the state's exclusive right, although all socialist organizations are free to utilize this invention without hindrance or charge. Thus, the legal conditions for an invention which is protected by a patent in the SRR hardly differ from the legal conditions of an invention protected in the USSR by an inventor's certificate. In order to ensure that the rights of the patent holder are in line with national interests, the HPR (Hungarian People's Republic) has introduced a special legal article which makes it mandatory for the patent holder to make broad use of the patented invention

in the economy, and it stipulates that compulsory licenses be issued for the utilization of an invention to the maximum possible extent.

In the PPR (Polish People's Republic) an organization named as the patent holder cannot impede other organizations in the socialist sector in the use of this invention and can only lay claim to a portion of the economic benefit derived from its use. This feature distinguishes the right of the patent holder in a socialist organization from the right which follows from the classic patent monopoly, which amounts essentially to a ban on the use of the invention without the agreement of the patent holder, something which negatively effects the scale on which the invention is introduced into the economy. In the same way that a socialist enterprise is not the owner of state property assigned to it but has certain rights to the property, which are named by the right of operations management, a socialist organization which holds a patent does not become an ordinary patent holder but acquires the right of operational management for the patent, the specifics of which are determined by the non-material nature of the object of that right.

The introduction of this kind of patent does not solve all the problems of price formation for the designs produced by scientific-research institutes. These designs may be based on foreign rather than domestic inventions, and in this case the design (know how) may be acquired abroad under a license agreement, and consequently, the principles of price formation must be different. At the same time this kind of patent will influence cost-accounting relations among sectors. For example, an invention produced by one of the machine-building sectors will be introduced into the cost-accounting relations of all the machine-building sectors in accordance with its real value, which at the present time is not taken into account due to the no-charge procedure for the use of inventions which are protected by inventors' certificates. The introduction of this kind of patent will also require the development of clear methods for judging the influence of various organizations' inventions on the object of new technology (output)--at present these problems are solved only in world trade practices by means of licenses and in the economic management practices in these socialist countries.

In this way the above-mentioned decree about the improvement of the economic mechanism in the USSR introduces a new principle for stimulating the introduction of inventions, a principle which differs from the incentive principles adopted in the practice of the socialist countries. The introduction of this principle is a new stage in the stimulation of scientific-technical progress and of a key element in it--inventions.

Inventors' certificates are usually issued for inventions created in the USSR by scientific-research institutes, enterprises and individuals. An inventor's certificate testifies to the state's exclusive right--socialist organizations in the USSR can utilize these inventions without hindrance or charge. In the transmission and utilization of designs which contain domestic inventions, the economic mechanism within the USSR in no way establishes this circumstance, and the creation of highly-effective inventions has virtually no influence on the basic results of the activities of organizations, especially the scientific-research institutes. This means that the scientific-research institutues which create original technological objects based on domestic inventions and scientific-research institutes which copy foreign technological objects and the corresponding inventions are in virtually the same situation. The exception lies in the overseas sale of an invention under a licensing agreement. Organizations (and especially scientific-research institutes) which have sold licenses for their own inventions abroad, receive a certain proportion of the foreign currency obtained but when using it they must refund a corresponding amount in rubles. This is a unique measure contributing to the creation and effective utilization of inventions; it was in effect before the above-mentioned decree. In the socialist countries organizations which have sold license abroad receive more encouragment.

There are special legal conditions under which patents for inventions are issued in the USSR. Nearly all patents issued in the USSR belong to foreign firms. After the USSR joined the Paris Convention on the Protection of Industrial Property in 1965, the number of inventions which foreign firms patent in the USSR grew sharply. Every year about 3,000 patents for inventions are issued in the USSR. During the 15-year life of the patent in the USSR, the patented inventions can be used only by agreement of the patent-holder and on the conditions proposed by the patent holder.

Before the adoption of this decree the creation and use of inventions, as already noted, had virtually no effect on the results of work or on incentive measures for collectives at the respective organizations and enterprises. Because inventors may be officials of the respective scientific-research institutes or enterprises, the technical policy of a sector may prove not be an optimal one, and it may not be coordinated with the existing system of incentives.

Methods for determining wholesale prices and norms for the net output of new machines, equipment and instruments for production-technical purposes establish that supplements to the wholesale price are used only for those forms of output in the production of which an invention constitutes the basis or a basic element.

The question as to whether an invention is the basis or a basic element is established by a decision, which is agreed upon by the basic producer and consumer. In other words, the choice of a direction in technical progress is decided by two ministries--the basic consuming ministry and the basic supplying ministry. Undoubtedly, this is a step forward in the sense of the greater advisability of choosing a direction of technical development in comparison with the situation which existed prior to 1979, in which the direction of technical development was determined primarily by the producing ministry. However, in practice, the resolution of the problem of choice runs into a multitude of problems. The problem is that a substantial improvement in the quality of output can be achieved not only through the utilization of inventions (as the basic element) but also by obtaining better quality raw materials from suppliers, by optimizing the engineering parameters of the object of technology, by successfully planning it or by having an enterprise with a high organizational-technical level in general.

The use of an invention in the production of new output is not a guarantee that a high technical level of output or greater economic effectiveness will be achieved. There is indirect confirmation of this in the fact that only 2 percent of the inventions which are registered in the USSR are patented abroad and only one-third to one-fourth of them are used in the economy. The State Committee for Inventions and Discoveries conducts a patent examination of invention applications; the purpose of this examination is to determine whether or not to issue an inventor's certificate or a patent for an original technical idea with the essence and volume of rights to the idea clearly established. This kind of examination cannot establish the possibility or advisability of using the invention in the economy, i.e., it cannot resolve a specific question of technical policy. Any judgment of an invention's usefulness which is made during the process of a patent examination has limited accuracy and is made primarily to discover the essence of the invention and its creative nature. There are several reasons why it is impossible to determine an invention's economic usefulness during a patent examination. An invention's usefulness depends on the level of know how which has been developed--the supplementary information without which the industrial utilization of an invention, especially a major invention, is technically impossible or economically unprofitable. This information, which is essential for industrial utilization of the invention, comes to the developer later, and every refinement of the details of this use is linked to the risk of losing state priority for this invention. Every invention can be improved, and the lack of methods for determining the prospective usefulness and the length of useful operating life makes judgments unreliable. Finally, the relation between the usefulness of specific inventions (dyes, for example) can be changed not because of their essential nature

but rather because of inventions in related sectors (in this case changes in the methods of producing the raw materials for these dyes, which may make one dye much cheaper than another).

It takes an employee of the State Committee for Inventions and Discoveries about one or two working days to complete a full application examination, and for this reason this examination cannot duplicate the apparatus which carries out a sector's technical policy. Moreover, the existing legislation does not stipulate that every invention which is registered must be more useful than existing ones, and in this regard, inventions which are of equal value and identically useful, but technically different, may be recognized as inventions.

At the same time, an invention which represents only a small improvement in the mass production of an obsolete product may yield a large economic effect, and, on the contrary, a product which is based on a pioneering, fundamentally new invention, by no means always provides a large economic effect in the first years of its production or individual use.

Because strains of micro-organisms, chemical products and methods of technology can be recognized as inventions, as well as because several inventions in the most varied combinations can be used in the production of new output (technology), the question of the practical use of wholesale price supplements for new, highly-effective output becomes extremely complex, and the methods for resolving this problem have not yet been worked out.

In our view, dividing inventions into the following three groups on the basis of the results of their use in the production of output can be a starting point in the analysis of this complex problem:

1) inventions of particular importance, which open up fundamentally new directions in the development of production, inventions which the technically advanced countries are forced to utilize simultaneously on a broad scale; these inventions provide for exports of output on the basis of monopoly prices ensured by overseas patents or the sale of licenses;

2) major inventions, which constitute a small group of interchangeable inventions which ensure the output of products at the level of the best domestic or foreign standards, as well as the sale of licenses or the export of output at oligopoly prices ensured by overseas patents.

3) insignficant inventions, which do not yield established results when they are used overseas, inventions which are difficult to distinguish from the engineering optimization of the object of

technology, and which provide for an improvement in second-rank parameters of output.

If we look at inventions which were particularly important in their time such as the discovery of pencillin, the creation of nylon or the transistor, etc., we note that after they were put into industrial production, the per-unit cost of these products dropped many times over; moreover, the reduction was caused by smaller and less valuable related inventions, as well as by the engineering optimization of the technology used in their production. Existing methods do not make it possible to fully take into account the economic effect of using particularly important inventions, but a change in the parameters of the technology for the mass production of this output, as a rule, provides an opportunity to clearly define the economic effect.

The most significant property of particularly important inventions consists in the fact that the output, which is created using these inventions as a basis remains over a long period of time unsurpassed, and by virtue of this all the technically advanced countries are forced to use them at the same time.

The significance of the wholesale price supplement stipulated in the above-mentioned decree lies in increasing the incentive to take a justified technical risk and in overcoming the increased technological and economic difficulties related to the production application of particularly important and major inventions.

Clarity is lacking on the issue of who should receive the supplement, whether it should be just the enterprise which pioneers in the introduction of the invention or whether it should also go to the enterprises which introduce this same invention later. Because the supplement is established for output, one can assumed that it is granted to all enterprises which start to produce the item. This resolution of the question deprives the supplement of its incentive effect (or reduces it a great deal) because the enterprises which introduce the invention later carry practically none of the risk taken by the enterprise which pioneered in its introduction, and they can also benefit from the knowledge and experience acquired by the latter. Enterprises which introduce output based on domestic inventions later than the pioneering enterprise are in a preferable position as are enterprises which introduce output based on major foreign inventions because these inventions have already been put into practice and the risk associated with their introduction is lacking as a rule. Granting the supplement only to the pioneering enterprise substantially increases the incentive to search and develop production of those items which are based on major domestic inventions, and depriving enterprises which assimilate the invention later (of this or a commensurate) supplement to some degree reduces these incentives. In this

regard it is worth considering the question of the advisability of introducing a differentiated supplement, especially in those cases in which the production start-up for this item is related to increased economic expenses.

The above mentioned decree calls for an increase in the wholesale price supplement granted for output of improved quality when the production of this output is based on designs recognized according to the established procedure as discoveries or inventions. The existing Regulations on Discoveries, Inventions and Efficiency Proposals does not stipulate any procedures or rules for judging the influence of discoveries on the quality of output. What is registered in the USSR as a discovery (properties, phenomena, laws of the material world) does not exert a direct influence on the quality of output, but the essence of certain inventions coincides with or directly flows from the registered discoveries. In these cases it is more correct to consider that the decree's article concerning the supplement also applies to inventions which open up new directions in science and technology.

Matters are somewhat better with regard to the influence of inventions on the properties of the objects of technology. At the present time some consideration is given to the utilization effectiveness of these inventions. The utilization effect, which is determined by the enterprise for the purpose of paying compensation to the inventor and bonuses to the people who facilitate its introduction, is included in the reports and in the bulletin entitled VNEDRENNYYE IZOBRETENIYA [Applied Inventions]. No attempts to coordinate the system of incentives for inventors and the system of incentives for enterprises which start to produce items based on the most important inventions have been undertaken since the publication of the above mentioned decree. And the coordination of these two systems not only will increase the soundness of the grounds on which the amount of an inventor's compensation is determined, it will also increase the incentive effect of this compensation because this coordination will make it possible to reduce the gap between the time the invention is first utilized and the time when the inventor can claim his compensation.

The amount of the inventor's compensation depends on how economically effective the invention is when used, and this is determined on the basis of the existing Methods (Basic Articles) for Determining the Economic Effectiveness of the Utilization of New Technology, Inventions and Efficiency Suggestions in the National Economy, which were approved by the State Committee on Science and Technology, USSR Gosplan, the USSR Academy of Sciences and the State Committee for Inventions and Discoveries on 14 February 1977, or on the basis of the actual value of the invention, which is determined by experts using special tables

which take into account the positive effect of the invention, the sphere of utilization, the complexity of the technical problem resolved and the creative level of the design. However, the methods for determining an inventor's incentive payment have some inadequacies.

The economic effectivenss of invention utilization is determined through a comparison with a base object; however, the choice of this object is frequently subjective, and the information about the base objects which exist overseas and which is essential for making the calculations is not always reliable or may be lacking. In addition, a small improvement in the mass production of an obsolete item and a pioneering invention (which opens up a new direction in science and technology) may possess identical effectiveness. When establishing the actual value of an invention, the choice of factors for determining the amount of compensation is frequently subjective, and this is not fully in line with the solution of the problem of paying compensation which corresponds to the value of the invention.

To a significant degree the system of compensation for inventors remains oriented toward the encouragement of less-original innovations which are used in mass production. When licenses for an invention are sold abroad the inventor receives up to 3 percent of the sum realized from the sale, not exceeding the existing maximum compensation of 20,000 rubles. Undoubtedly, this has a negative effect on the orientation of both technical creativity (lack of correspondence between material and moral incentives) and (in the final analysis), technical policy, as well on the quality of output produced and the level at which social needs are satisfied.

Patent statistics are one of the indicators of the level of technical development. The ratio of a given country's patents which are being used throughout the world to the patents of other states which are used in that country is 13-fold lower for the USSR than it is for the USA and 10-fold lower than it is for the FRG. Of course, these data are influenced by delays in applying major domestic inventions and the corresponding low level of activity in moving domestic inventions onto the license markets. Dividing inventions into groups on the basis of the results of their utilization, a process which does not reject but instead amends the existing principles for determining the amount of the compensation for the invention, will ensure unity in the material and moral incentives or will provide the necessary orientation for a system of incentives for technical progress. A similar differentiation of inventions is made in the PPR (inventions and useful models) but within the framework of a different economic mechanism.

At the present time there are practically no generally accepted methods for determining the influence of inventions on the basic parameters of output or for identifying inventions which make up the basis of industrial output; as a result, shifting the burden for the resolution of the wholesale price supplement question to the discretion of the producer and the consumer of the output will encounter significant difficulties and can have a negative effect on the encouragement provided to those who apply the most major inventions.

Our proposed differentiation of inventions may become not only a basis for differentiating economic incentives applied to enterprises which produce output of a fundamentally different technical level. It is even more important to use this differentiation to coordinate other levers for the stimulation of scientific-technical progress and to orient them toward the achievement of the best possible results; these levers include the payment of compensation to inventors and bonuses for the establishment and introduction of new technology.

The system of bonuses for the creation and introduction of new technology is linked to a certain degree to the system for stimulating inventions. If inventions are included in the plan of new technology, the people who develop the object of new technology may receive a bonus for promoting the introduction of the invention as well as a bonus for the new technology for the same project. The size of the maximum bonus given to any one participant in the project for the results of the work cannot exceed six times his salary. The maximum payments for any one object of new technology can amount to 200,000 rubles, that is, they can exceed the payment for a major invention (20,000 rubles for an inventor and up to 35 percent of this sum as a bonus for the person or body which facilitates its application).

It is well known that the discussion on how to formulate the concept of an object of new technology has lasted for more than 10 years. However, definiteness on this question is still lacking. In accordance with the existing rules at least six categories of output can be related to the new technology: 1) output which is at the level of the latest achievements of world science and technology; 2) output which is superior to that level; 3) output which meets the best domestic standards; 4) output which meets the best foreign standards; 5) output which exceeds the best domestic standards; 6) output which exceeds the best foreign standards.

The requirements for new technology are still insufficiently clear: a definite time interval exists between the latest achievements of science and technology and their implementation; on the other hand, output which comes under the category of new

technology is not required to be superior to the best domestic and foreign models. In the Methods (Basic Articles) for Determining the Economic Effectiveness of the Utilization of New Technology, Inventions and Efficiency Suggestions in the National Economy (point 3) contains an attempt to provide a definition of the new technology: "The new technology includes results of scientific investigations and applied design work which are being implemented in the national economy and which contain inventions and other scientific-technical processes of production, tools and objects of labor, methods of production organization and labor which, when utilized, ensure an increase in the technical-economic indicators of production or the resolution of social and other tasks in the development of the national economy in accordance with the plans for the development of science and technology at all levels of management."

At the same time the Methods lack clear criteria for whether an object belongs in the new technology category. This is explainable to a certain degree: in technical development a sector is limited by the available technology, as well as by supplies of raw materials from other sectors, and for this reason the production of output on a level which exceeds the best models--domestic and foreign--is not always possible; at the same time the decision made by the appropriate department as to whether an object belongs to the new technology category can lead to a non-optimal technical policy in the sector.

In our view, the inadequacy in the definition of new technology consists in the lack of clarity about what forms of work constitute its foundation. At the foundation of the production of any new object of technology and its application there is information which is reflected and established in the appropriate technical documentation, whether it be a manufacturing process, a machine or a machine tool.

The appearance of a comparatively new form of incentive for technical progress such as bonuses for new technology results from a new phenomenon and a very important aspect of scientific-technical progress--the presence of a large volume of information, without which the industrial utilization of inventions, especially the utilization of major inventions, is technically impossible or economically unprofitable and the creation of which requires significant joint efforts by various types of specialists and sometimes of entire scientific-research institutes. A large part of this output is "not materialized" in finished output and is not well known outside an enterprise--in the world license trade it is called know how. Know how is the object of licensing agreements precisely because of its great technical-economic significance for the effectiveness of industrial production. Know how is a separate, independent object of

approxmiately 30 percent of the licensing agreements which are concluded, and instances of the sale of licenses for inventions without the corresponding know how are not typical and take place only when the licensee does not have the opportunity to obtain the know how, but has his own scientific-technical potential which enables him to create the necessary information through his own efforts. Usually know how includes the engineering optimization of the parameters of production technology, the requirements for raw materials and equipment, the methods for monitoring the progress of the manufacturing process, data on the nature of the manufacturing process which make it possible to adjust and optimize the technology in a purposeful manner, experience on the elimination of breakdowns and the causes of faulty production, etc. Know how is protected by special legislation only in the HPR (among the socialist countries).

The plans for new technology compiled by the ministries include primarily the most important inventions or groups of them which can be either domestic (and correspondingly are protected in the USSR) or foreign. The economic effectiveness of new technology based on major domestic inventions may coincide with the economic effectiveness of new technology based on foreign inventions when it is calculated according to the existing methods (the Basic Articles) for determining the economic effectiveness of the utilization of new technology, inventions and efficiency suggestions in the national economy.

It should be noted that the realization of foreign inventions in objects of new technology (when there are no purely legal barriers to this) carries practically no technical risk, because the tasks being resolved are fully known in advance. But in the process there is a sharply increased risk that this new technology will become obsolete. The economic consequences of this technical policy alternative are also contained in the fact that expenditures for this new technology are not recovered additionally through the sale of licenses or the export of output at the monopoly prices ensured by patents on Soviet inventions abroad. Exporting output overseas is practically impossible in the first place because of the patents effective in the countries of possible export (they last an average of 20 years), and it is unlikely in the second place because of trade marks and the fact that the former patent holders have a firm hold on the sales market.

The utilization of major domestic inventions in objects of new technology leads to a situation in which expenses for this new technology are additionally recovered through the sale of licenses or through exports at higher prices ensured by patents. The existing system of bonuses for the creation and introduction of new technology does not take these circumstances into account, and for this reason there arises an increased desire to avoid the

pioneering utilization of major inventions (domestic), as well as the technical risk and technological difficultes involved in introducing these inventions. And consequently, when new technology is being designed, there arises a desire to copy similar models of foreign technology.

It seems that the classification of new technology according to the level of its decisions should be analagous to our proposed classification of inventions, taking into account the fact that information essential for the production of new technology may be viewed as an object of a licensing agreement. Under this classification the third "new technology" group does not have to contain major domestic inventions or any domestic inventions at all. This group's lack of technology based on major domestic inventions means that overseas there is similar new technology which is most likely of equal value, the production technology for which can be acquired under a licensing agreement. The ratio of the license price to the expenses of our scientific-research institute to develop equivalent technical documentation can be a more objective basis for awarding bonuses for the development of new technology or it can be a very important corrective to improve the existing bonus system. In this regard it is necessary to take into account the level of expenditures and the utilization effect of new technology which is based on particularly important and major inventions, as well as currency income from abroad, which is obtained through the sale of licenses or the export of output at the higher prices ensured by the patents.

Clearly it is advisable and timely to consider removing the limitations on bonuses for new technology, and especially on bonuses for the establishment of new technology which is based on particularly important inventions; the question of improving the bonus system should also be considered.

At the present time the maximum bonus for new technology is six times a person's salary for any results of the work (aside from the results fulfilled at the level of the invention, for which the inventor's compensation is issued regardless of any bonus for new technology). This kind of situation can hardly be oriented toward the highest results. Unfortunately, until there are guarantees that the size of the bonus corresponds to the results of the work, the guarantees may be increased by establishing authorship for the most important components of the information which constitutes know how and by paying bonuses for this information over a period of years; they may also be increased as a result of the overseas sale of know how or output based on that know how at elevated prices. In other words, the system of bonuses for new technology must be supplemented by a system similar to the existing system for the protection of efficiency suggestions. The differences in the essential technical nature of inventions and efficiency suggestions are not

fundamental. The level of novelty and creativity required for efficiency suggestions is significantly lower: for example, an an efficiency suggestion is not discounted for lack of novelty because an identical solution is available in the enterprise's technical library. This makes it possible to encourage initiative in the dissemination and adaptation of technical innovations to the conditions of a particular enterprise.

Guided by the principle which is being proposed, efficiency suggestions regarding the technical level can also be divided into three groups: 1) the most valuable suggestions, which improve the development of new technology and are included under know how; 2) efficiency suggestions which improve the objects of new technology and 3) efficiency suggestions not applicable to new technology. The system of bonuses for new technology must also call for the identification and evaluation of technical-economic significance, as well as the capacity for utilizing know how and keeping it secret.

The differing tendencies of the currently existing incentives are obvious from the following example. An inventor receives material encouragement when a license to his invention is sold overseas: this is up to 3 percent of the amount received, but cannot exceed the limit of the existing compensation maximum; people participating in the sale of the license receive up to 5 percent of the amount. But the people who develop the new technology and the corresponding know how do not receive incentives, and without them the sale of the licenses is simply impossible (as is the industrial utilization of the invention in general).

There is a separately operating system to encourage the development of output to be supplied for export, but it does not take into account the ability of the output to compete; this competitiveness which comes from the presence of the particularly important or major domestic inventions and highly effective know how on which this output is based. Moreover, the inventor is not encouraged if the currency income arises not from the sale of the license but from the export of the output at monopoly prices ensured by the patents for a Soviet invention.

Implementing the articles of the 12 July 1979 decree of the CPSU Central Committee and the USSR Council of Ministers will provide the conditions for the establishment of a single coordinated system of incentives for inventors, collectives of people who are developing new technology and of enterprise employees who are putting it into production, a system which is oriented toward the achievement of the highest results.

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USE OF ECONOMIC MECHANISMS IN MANAGING SCIENTIFIC AND TECHNICAL PROGRESS

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 11, Nov 83 pp 72-78

[Article by P. Pogudin, deputy administration chief of the Ministry of the Chemical Industry; and Ye. Osatyuk, laboratory director at the Technical and Economic Research of the Chemical Industry Scientific Research Institute: "The Economic Mechanism for Controlling Scientific and Technical Progress in Industry"]

[Text] One of the most important conditions for intensification of the economy is increasing the level of control over scientific and technical progress. The decree issued by the CPSU Central Committee and the USSR Council of Ministers "On Measures to Step Up Scientific and Technical Progress in the National Economy" plays an important role in this area; it directs ministries and departments to expand the use of special, programmed planning in the development of science and technology. In accordance with this decree, beginning with the 12th Five-Year Plan unionwide, republic (inter-republic), and sectorial (intersectorial) scientific and technical programs will be worked out, as well as scientific and technical programs for regions and territorial production complexes. The basic goals of these programs should be included in five-year plans and annual plans.

Today experiments are being carried out on a large scale in sectors of industry; the basic aim of the experiments is to increase the role of economic factors in the system for controlling scientific and technical progress. A certain amount of experience in this area has been gained in the chemical industry, which has at its disposal immense scientific potential. Functioning in the sector are over 100 scientific organizations and their branches and about 50 experimental plants and experimental production facilities. Over the past 10 years expenditures on developing the industry's scientific sector have almost doubled.

Since 1972 special, programmed planning has been used in the sector and there has been control over scientific and technical development; this has had a positive effect on the plan's structure. There has been a significant increase in the complexity of research; the number of small-scale developments has been reduced to almost five-sevenths of the previous level. In 1980 the sectorial standard for setting up and conducting research and development was approved; the basis of the standard is the principle of complete planning, from scientific research and development through realization of their results. The

system by which topics are included in the plan has been improved; a unified form for pre-planning substantiation has been introduced which includes the necessary information on the development (its basic technical and economic indicators, scientific and technical level, the demand for the product, availability of resources, and so on); model types and stages of operations have been established, along with methods for their adoption and formulation.

The preparation of basic sections of the plan for developing science and technology (calculation of the necessary financing, evaluation of the effect on technical and economic indicators, etc.) is carried out with the help of electronic computer equipment, which makes it possible to apply the principle of multivariance at the plan's development stage. This in turn made it possible to improve the structure of the plan for the sector's scientific and technical development during the 11th Five-Year Plan. Special programs to create and improve chemical products, materials, manufacturing processes, equipment, and automatic control systems accunted for 57 percent of the plan, as opposed to 51 percent in the 10th Five-Year Plan.

Financial levers are tied closely to special programmed planning and control. When the industry was converted to a cost accounting system for organizing operations using new technology, the primary financing source became a unified fund for scientific and technical development. This fund is formed on the basis of a stable, fixed standard from the volume of commodity production of production associations and enterprises of the Ministry of the Chemical Industry. A long range fixed standard is also used to determine expenditures on scientific research in the industry.

Means from the unified fund for scientific and technical development are distributed in the following order: combined special and scientific and technical programs receive priority financing; next in line are topics included in the industry's scientific research plan; and finally, work of a subsectorial nature and organizations' projects. As a result, themes of national economic significance during the current plan accounted for 42 percent of the funding, as opposed to 37 percent in the 10th Five-Year Plan.

An important role is assigned to improving the methodology for determining the economic effectiveness of research and development. The Ministry of the Chemical Industry's instructions for determining the economic effect of new technology outline the peculiar features involved when the industry's organizations develop new technology. The instructions introduce the concept of a novelty period for the new technology to encourage developers; they contain methods for calculating the effect of using a product that has no analogue, as well as the effect of improved quality; and the effect of technology that makes it possible to utilize poor raw materials and production wastes and technology aimed at replacing raw materials that are in short supply and improving methods for treating waste water and gases, prolonging the period of use of construction designs, and so on. This did a great deal to increase the role of incentives in choosing long-range directions for scientific research.

As scientific organizations are converted to the cost accounting system, questions of improving indicators and the mechanism of the system for forming

and utilizing incentive funds take on special importance. As the experience of the Ministry of the Chemical Industry demonstrates, when these indicators were not adequately developed, the conversion of a number of the sector's organizations to new management methods was delayed. Among the unresolved problems is the application of a regressive, graduated scale for determining the size of incentives for scientific organizations during the initial stage of introducing a cost accounting system. Some important flaws have been revealed in the scale: the values given do not distinguish between qualitatively new developments and operations for partial improvement of existing equipment; there is a lack of linearity in the deductions for operations of varying effectiveness; and it does a poor job of orienting scientific organizations toward raising the scientific and technical level of their research and development.

In connection with this, the Ministry of the Chemical Industry established a method for differentiating the size of incentives offered; it is based on two basic parameters of the work being performed: its economic effect and scientific and technical level. This method was used in the sector on an experimental basis between 1978 and 1980 in accordance with a decision made by the USSR State Committee for Labor and Social Problems and the USSR State Committee for Science and Technology. The advantage of this method is that the incentive mechanism directly includes an indicator of the scientific and technical level, which describes the extent to which long-range scientific and technical solutions are realized in new projects.

When one speaks of the scientific and technical level of research and development, one is referring to a set of basic technical and economic indicators that are characteristic of the particular type of technology. For example, for an industrial process this set of indicators should include production costs; product quality and yield; productivity of the production line; expenditure of raw materials, reagents, and auxiliary materials; and the periodic or continuous nature of the process. The indicators should also take into account the resolution of problems involving automation and environmental protection. New products, substances, and materials are compared in terms of their production costs and properties (such as the content of the basic substance, impurities, heat resistance, and other qualitative parameters that are specific to the particular product).

The value of developments that are on a high scientific and technical level lies not only in their good technical characteristics, but also in the fact that in the majority of cases they provide a large increase in proportionate effectiveness compared to nonoriginal developments. If one takes the average economic effect obtained from the application of one development that is on the level of the best foreign models as one, then analogous indicators for work performed at different levels throughout the sector as a whole appear as follows:

Table 1

Research and Development	1975	1976	1977	1978	1979	1980
Work carried out using inventions	0.92	1.12	1.03	0.51	0.65	0.57
Work carried out without the use of inventions	0.59	0.52	0.37	0.38	0.42	0.36

In order to conduct an experiment on the differentiation of incentives, all technological developments in the sector were classified according to three categories: developments that are carried out and exceed the level of domestic developments and are comparable to the best foreign achievements; developments that are carried out using inventions; other developments and measures. The fixed standards for deductions for incentives funds of development organizations (expressed as a percentage of the economic effect from developments and new technological measures) were 10.5, 9, and up to 6, respectively.

It was determined that deductions for incentive funds are made for each development over the course of 1-3 years depending on their importance and scientific and technical level. The economic effect was determined every year by comparing current indicators with indicators from a baseline year (that is, the year preceding the introduction of the given development).

This system of deduction standards provided the most favorable conditions for those scientific organizations that had at their disposal an adequate portfolio for incorporation of not simply effective developments, but also those carried out on a high scientific and technical level. When this incentive method was being worked out, the peculiar features involved in the formation and realization of the economic effect of several types of new technology (production) were taken into account, for example, various types and assemblies of special purpose equipment, reagents, and especially pure substances, the application of which provides a high proportionate effectivenss, but which are produced in limited quantities. Plans were made to provide incentives for this type of work by raising the standards (by a factor of 2 or 3), which put them on a relatively equal footing with other developments.

The advantages of the method for differentiating deductions depending on the scientific and technical level of the research and development are obvious. In the first place, it eliminates the principle of regression in determining the size of incentives on the basis of increased effectiveness; in the second place, a distinctive economic barrier is created against carrying out developments on a lower scientific and technical level.

The mechanism by which this incentive method causes an increase in the scientific and technical level of research and development is illustrated by the data presented in table 2. They describe the pattern of deductions for funds of scientifc organizations under the Ministry of the Chemical Industry for work at varying scientific and technical levels.

Table 2
(expressed as a percentage of the sector-wide total*)

Research and Development	1976	1977	1978	1979	1980
Work that exceeds the level of domestic developments and is comparable to the best foreign achievements	14.7 15.2	19.9 19.3	25.1 30.1	25.9 35.3	26.2 32.9
Work in which inventions were used	55.5 48.2	56.1 53.2	43.5 45.6	49.0 52.8	55.4 58.7
Other developments and new technological measures	29.8 36.6	24.0 27.5	31.4 24.3	25.1 11.9	18.4 8.4

*The numerator represents the economic effect and the denominator the deductions for incentive funds of scientific organizations under the Ministry of the Chemical Industry for work done at the corresponding scientific and technical level.

Application of the method of differentiated deductions, combined with special, programmed planning and a system of priority financing for scientific research and experimental design work made it possible by the beginning of the current five-year plan to make a sharp reduction in the number of nonoriginal developments included in the plans of scientific organizations. Evidence of this can be seen in the data presented in table 3.

Table 3
(expressed as a percentage of the sector-wide total)

Research and Development	1976	1977	1978	1979	1980
Work that exceeds the level of domestic developments and is comparable to the best foreign achievements	20.6	23.9	28.8	30.5	31.7
Work in which inventions were used	38.9	47.0	50.5	56.7	58.4
Other developments and new technological measures	40.5	29.1	20.7	12.8	9.9

Furthermore, a three-year period during which the method for differentiating incentives was applied revealed the need for additional improvements in the method that would be aimed at exerting a more active influence on developers to

step up scientific and technical progress. If the first stage included resolution of the problem of rapidly reducing the number of nonoriginal developments, later on substantial improvements were made in the incentive mechanism, taking into account basic trends in scientific and technical development (in particular, focusing the attention of scientific organizations on creating fundamentally new models of equipment and products).

The main task was to provide priority incentives for creating new technology, that in terms of its basic technical and economic parameters exceeds the best foreign achievements. This is a fundamentally new, special direction, which makes it necessary to refine the classification of operations by level now being used in the industry. Furthermore, when incentive funds were introduced in 1980 at scientific organizations and enterprises that had been converted to the cost accounting system, it became necessary to put incentives for new technological developments with individual and mass applications on an equal basis in terms of the various methods used to determine their economic effect.

Since 1981 an improved graduated scale of differentiated standards has been used at organizations and enterprises of the Ministry of the Chemical Industry for determining the size of deductions for the incentive fund for work on new technology. Included in the group of developments on the highest level (B) are research projects, the results of which have been incorporated as new technology and in terms of their basic technical and economic indicators exceed both the best domestic and foreign achievements. These are fundamentally new developments that are without prototype or functional analogues in the USSR and abroad; they are also articles with better basic properties than the best domestic and foreign analogues that provide high technical and economic indicators (characteristics); and they are new technological articles included in the approved plan for sale of licenses, or for which licenses have been sold or foreign patents obtained.

Level C developments include research, the results of which are incorporated as new technology and correspond in terms of their technical and economic indicators to the best foreign and domestic indicators. This group also includes articles that have been incorporated on the basis of purchased licenses accompanied by domestic scientific and technical developments, while the article's basic technical and economic indicators correspond to the world's best achievements at the time the country incorporates the article. This group includes developments that have functional analogues in the USSR and abroad.

Level H-1 developments include research that is not covered by levels B and C, and that involves the use of inventions which serve as the basis or as basic elements of the new technology. These are developments that are incorporated by means of inventions created at the organization or borrowed from some other source, which are protected by patents or by positive decisions regarding applications for inventions; and work done to reproduce articles of foreign technology that do not contain inventions, under the condition that they meet the requirements for patent integrity.

Finally, level H-2 developments include research not covered by levels B, C, and H-1 and that is carried out without the use of inventions that form the basis or serve as basic elements of the new technology.

The system for classifying developments by various levels is carried out by the Ministry of the Chemical Industry in cooperation with the USSR State Committee for Science and Technology.

In the new graduated scale the discrepancy among standard deductions for work of different scientific and technical levels is increased substantially, which provides the necessary conditions for intensifying the economic effect on scientific organizations, which will in turn encourage them to conduct more long-range research.

The principle of differentiation in deduction standards is also used in the formation of incentive funds at the industry's experimental plants. In this case, however, the standards are differentiated not according to the scientific and technical level of the work (since the long-range nature and scientific and technical level of developments is the special realm of the researchers), but according to the level of the plan (national economic, sectorial, subsectorial). This approach makes it possible to consider more closely the tasks facing the experimental plants with regard to prompt and complete testing of scientific research results. The scale of standard deductions for incentive funds used at experimental plants is presented in table 4.

Table 4

Plan level of work performed by the experimental plant	Standard increase in deductions (as a percentage of the material incentive fund for the corresponding period of the annual plan)
Assignments called for by special combined programs and problems in fulfilling scientific and technical programs; by the State Plan for the USSR's Social and Economic Development; by decisions of government and state administrative organs; experimental and other production included in the products list of the national economic plan	10
Assignments outlined in the plan of the Ministry of the Chemical Industry; experimental production (experimental industrial batches of new types of products and articles included in the Ministry's products list)	9
Assignments outlined in the industrial production association's plan; experimental production of articles included in the association's products list	8
All other types of experimental operations and experimental production not included in the plans named above	6

A similar principle is employed to decrease deductions for the material incentive funds of experimental plants when they do not fulfill the quotas they have been assigned for various operations. This method encourages these enterprises to pursue the topics of products lists and especially important plan assignments.

Measures being taken in the sector to improve control over scientific and technical progress are contributing to an increase in the effectiveness of work done by scientific organizations. During the 10th Five-Year Plan the number of developments made by scientific research institutes and design bureaus that were incorporated and the economic effect from their use exceeded the indicators from the previous five-year plan by 38 and 41 percent, respectively. Between 1975 and 1981 there was a 33 percent increase in the volume of scientific research and experimental design work, while the number of developments that were not incorporated declined by 24.8 percent. The structure of experimental operations has been improved. In 1981 over 35 percent of the experimental testing work involved topics included in the national economic plan; in 1976 this figure was 24 percent. The return on each ruble spent on the development of industrial science between 1976 and 1981 was between 2.6 and 3.1 rubles.

The application of new methods in the sphere of industrial science, and in particular the stimulation of actual indicators of the resulting economic effect, are contributing to an increase in the volume of investigative research as the basis for future results, and they are also strengthening scientific contacts between organizations of the USSR Academy of Sciences and VUZes, which is an important factor in raising the level of specialization in research and in reducing the amount of time spent on each research project. The results of utilizing the new methods for controlling science and technology in the chemical industry prove that the necessary prerequisites exist for further increases in the effectiveness of scientific organizations.

Furthermore, the potential of new principles for managing industrial science is still not being fully utilized. A number of organizations are still demonstrating a low degree of effectiveness; many developments fail to have any significant effect on improving enterprises' technical and economic indicators, and they often wait a long time before finding any practical applications. In our opinion, flaws in the economic mechanism for controlling scientific and technical progress are an underlying cause of this.

With the aim of improving this mechanism, special attention should be focused on developing in every way possible the principles of cost accounting at every level of industrial science; a system of measures should be worked out that are directed at increasing enterprises' economic interest in increasing the amount of new technology in use; existing instructive and methodological documents should devote greater attention to questions of stimulating special industrial factors involved in developing new technology and to questions involving the nature of realizing the effect of new technology.

It would be wise to expand the sphere of action of the unified fund for developing science and technology; specifically, the ministry should be given

the right to use part of the fund to develop experimental bases for scientific organizations, as well as to finance scientific research and experimental design work performed by the plant sector of science in accordance with basic scientific and technical programs and sectorial programs.

The incentives offered to organizations that develop new technology are in need of further improvement. It is well known that a basic feature of the cost accounting system is establishing a direct relationship between the size of incentives and the economic results obtained from utilizing new technology. Meanwhile, the principle of orienting developers toward final national economic results in the form of an economic effect from the application of new technology is not adequately supported in the Provision on the system for formation and utilization of an economic incentive fund in scientific organizations and enterprises that have been converted to a cost accounting system. This applies, in particular, to developments discussed in points 6a and 6b in the Provision, which call for incentives based not on actual economic effect, but on the size of the guaranteed economic effect that is determined after the work is received. As a result, scientific organizations have little interest in the rapid incorporation of their innovations. Therefore, it is of the utmost importance that these points be reworked so that incentive funds be formed only on the basis of indicators of the actual economic effect obtained from incorporating developments.

At the June (1983) Plenum of the CPSU Central Committee the issue of shortcomings and difficulties that are holding up the practical application of research results was raised with great urgency. Yu. V. Andropov, general secretary of the CPSU Central Committee, made the following observation at the Plenum: "The manager who took a 'risk' and introduced some new technology at his enterprise, or utilized or produced some new equipment, often ends up a loser, while those who avoid innovations lose nothing"*. Indeed, today the system for encouraging new technological applications does not play a significant role in the formation of enterprises' incentive funds. For example, over the past 7 years the funds allocated for new technological applications accounted for no more than 4-6 percent of the total incentive funds at chemical industry enterprises. Along with shortcomings in the compensation mechanism in the process of incorporating and assimilating innovations, this sharply reduces enterprises' economic interest in increasing the amount of new technology they incorporate, especially that involving major developments.

One of the ways to resolve this problem could be integration of the incentive systems for new technological applications and for fulfilling basic activity indicators by increasing the role and influence of the new technology factor on the size of the incentive funds formed by the enterprise. Realization of this goal presents considerable difficulties, both in terms of selecting the

*"Materialy Plenuma Tsentral'nogo Komiteta KPSS 14-15 iyunya 1983 g." [Materials on the CPSU Central Committee Plenum 14-15 June 1983], Moscow, Politizdat, 1983, p 10.

appropriate indicators for fund formation, and in terms of providing substantiation for the mechanism by which corrective indicators (i.e., new technology factors) affect the size of the enterprise's incentive fund. The Ministry of the Chemical Industry is currently conducting research to develop a basis for an integrated incentive system and there are plans to start an experiment in 1984.

Also in need of further improvement is the mechanism for encouraging developments in new high efficiency production. In accordance with the decree issued by the CPSU Central Committee and the USSR Council of Ministers "On Measures to Step Up Scientific and Technical Progress in the National Economy", the USSR State Committee on Prices has been granted the right to establish incentive surcharges of 30 percent on wholesale prices for new high efficiency production and 30 percent discounts on wholesale prices for products that are to be taken out of production.

The main drawback of the existing system for establishing incentive surcharges is that when there is an increase in the specific economic effect resulting from the use of new types of products in the national economy, there is a rise in the surcharge on the wholesale price, but it still lags behind the rate of at which the economic effect increases. In other words, as the econcomic effect increases, there is a sharp decrease in its proportionate effect on the surcharge. So, for the development of new products with an effect of up to 10 rubles per ton, more than 20 percent of the economic effect is reflected in the surcharge; with an economic effect of 1000 rubles per ton, 10 percent is reflected in the surcharge; and with an economic effect of over 10,000 rubles per ton, no more than 2 percent is reflected in the surcharge. This kind of nonlinearity in determining the size of deductions for new types of products emphasizes even more graphically the defects in the mechanism for establishing incentive surcharges for chemical products that are manufactured in relatively small quantities (reagents, especially pure substances, various types of additives, etc.)

Clearly, it would be wise to form additional incentive funds for the development of new high efficiency production on the basis of estimated cost. In this case the size of the incentives would be based on the actual economic effect obtained in the national economy from the use of the new products, just as it is for technological developments.

Therefore, to step up scientific and technical progress we need a more flexible mechanism for accounting for industrial peculiarities involved in creating new technology so that priority incentives will be given to long-range directions in the development of science and technology.

9967
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BETTER CAREER GUIDANCE NEEDED BY YOUNG SCIENTISTS

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[Article by Candidate of Philosophical Sciences P. Shelish, senior scientific associate of the Institute of Socioeconomic Problems of the USSR Academy of Sciences, Leningrad: "After Defense"]

> [Text] Scientists whose efforts do not produce a single publication, a single invention over a period of many years are encountered with some frequency. Candidates of sciences who sharply reduce their creative activities after defending their dissertations can be found among them. Their rest break drags on for a period of years. Of course, there are not many such persons, and they do not determine the countenance of science. Nonetheless it must be admitted that a "life-long" attachment to this style--in the obviouse absence of the qualities necessary for work in science at that--is not a rarity. Even among those who are far from retirement age.

Until recently, young people went into science mainly because there were new positions to fill within it. Now they are being created in significantly smaller numbers, and the influx of young people is abating. Aging of scientific personnel is already noticeable even in what has been traditionally through of as a "young" center, the Siberian Department of the USSR Academy of Sciences, not to mention many others.

Youth, as we know, is the most intensive period of a scientist's creative life, a time when his most important scientific ideas arise. Aging of the personnel may weaken the creative potential of research institutions and disturb the continuity in the development of scientific schools and directions. The problem must be addressed right now.

The scientific profession enjoys respect in our country. However as in all other cases, its labor is assessed primarily on the basis of the substance of its results, and only their high effectiveness and quality can entitle the individual to continue his work in science. This is why we require continual selection of scientific and scientific-pedagogical personnel--from their assumption of the path of enquiry to mastery of the highest qualifications.

As is noted in the CPSU Central Committee and USSR Council of Ministers decree "On Measures to Accelerate Scientific-Technical Progress in the National Economy," special attention must be devoted to the training of scientists.

It would be useful to begin selection of future young scientists back in the VUZ, when we can reveal the most capable students showing interest in scientific work and subject them to specialized training. But if we are to help each student correctly select his specialty, we must reveal his capabilities and interests and acquaint him with the unique features and conditions of work in the basic types of organizations to which he may be sent (academic and sector scientific research institutes, planning institutes and so on). While the first task is completed more or less successfully in the leading VUZs, the second one is not even suggested as a rule. The students glean important information on the possible profiles of their future work from random, occasionally highly unreliable sources. And correct selection of a specialization requires at least a little personal experience, a test of one's strengths in professional work of different kinds.

The principal form of acquiring such experience during training in the VUZ is production practice. Students participate in it in only a single organization, and the ideas they acquire about the possible nature of their future work are far from complete. In my opinion we need to "filter" students of the higher school through a wider range of organizations--the principal users of personnel of the appropriate profile--so that by the last year of his studies the student could consciously select the type of specialization desired.

Such purposeful preparation of students is not conducted, and in reality, selection of scientific personnel begins at the moment that graduates are allocated to scientific institutions. In 1974 not less than 70,000 specialists joined the country's scientific institutions. But according to data of the Institute of Sociological Research of the USSR Academy of Sciences one out of every 10 students in the graduating class--that is, about 70,000 persons--went into science at that time. Five or six years later, according to the data of the same institute, as many as one out of every six graduates--that is, about 120-130,000, showed interest in the scientific profession. But the demand for new scientific personnel was not increasing at this time: It was even decreasing somewhat.

However, assignment to a scientific research institute does not yet mean that the young person has moored himself securely to the dock of science. Unfortunately, sometimes persons who prove themselves well in the VUZ are unable to find work within their capabilities in the scientific institution.

Why? The reason is that some scientific institutions have been orienting themselves for a long time on perhaps not very promising but at least familiar research subjects, and they are little interested in expanding the range of their research or the directions of their inquiry. Such organizations do not need the creative potential of young replacements, and they do not try to stimulate their growth--after all the leading specialist positions

are tenaciously occupied. Should it surprise us that following their mandatory period of service, less than half of the allotted young people remain in a number of institutes?

I think that in such a situation, appeals to trust the young more and to promote them more actively would not be of much benefit. It would be more important to create a situation of real competition of ideas and creative plans, on the basis of the tasks facing the specific scientific institutions, rather than to draw up the research plans and appoint subdivision directors on the basis of "tenure." This would make it possible to objectively evaluate the true potential of each scientist and to promote talented young scientists on better grounds.

It would be suitable for young specialists to serve an apprenticeship of 1 or 2 years in the scientific institution to which they are allocated. A thoroughly weighed decision as to who should be hired, who should be sent to graduate school, and who should be reconsidered for other training by the VUZ if he does not display an interest in scientific work, can be made on the basis of the results of such apprenticeship. Concurrently it would make sense to grant the VUZs the right to redistribute their graduates within the first 3 years of their work, if it is demonstrated that they are being utilized incorrectly.

In my opinion graduate study should be used in a better way as a means to select talented scientists. Admission to graduate study has not been growing for a number of years countrywide. This is hardly justified. Graduate study is not only and not so much study as it is work on a real scientific problem. Graduate students represent a detachment of researchers, and rather productive ones at that.

There are many difficulties in this area at the moment. While in the past, 3 years were enough to complete a candidate dissertation, now this time period is too short in many fields of knowledge. It often takes a year and a half or two to prepare an experiment, and about a year to process the results. Consider also that time is needed to take the candidate examination and to write up the dissertation and the documents necessary for its defense. It is no surprise that the overwhelming majority of graduate students do not defend their dissertations within the allotted time, which for some reason is the same for all, irrespective of the nature of the research topic they select. I believe it suitable to select, for graduate study, young specialists primarily from among those who had previously undergone apprenticeship and satisfied the minimum candidate requirements.

Objective and well-organized assessment of the productivity of scientific personnel is a necessity in all stages of a scientist's professional career. We need more than just the regular competitions to fill scientific positions and certifications of personnel in scientific research institutes. The objective of these procedures is to evaluate the colleague's suitability for a particular kind of work. But when there are no universally recognized criteria and methods of such evaluation, the task is hard to complete. The fact that only a negligible proportion of scientists subjected to reselection

and certification do not pass the tests suggests that the competitions and certifications are being conducted in formal terms only. Sharp differences in the productivity of colleagues occupying the same positions also attests to the low effectiveness of these "reviews of scientific strengths." Perhaps we should make periodic (perhaps once every 3 years for candidates of sciences and once every 5 years for doctors) confirmation of their scientific qualifications mandatory. Public defense of one or several scientific works completed personally by them within such a period could be the means of such confirmation. This defense can take the form of a report to a specialized council, which would then use the results of a subsequent discussion to make the decision as to confirm or not confirm the person's academic degree, and the high certification commission would examine these decisions only as a means of control. It would also make sense to grant specialized councils the right to recommend research to be defended for the purposes of confirming the candidate of sciences degree, or as a doctorate dissertation if it qualifies for this.

Of course, the requirements imposed on doctorate dissertations by the high certification commission make them more than simply evidence of a scientist's qualifications; they are also a claim to a highly substantial scientific result. But then, the "opponent" of the candidate must be a community of scientists working in the same research direction. In many cases these areas of research are not fully consistent with some one discipline within the nomenclature of scientific specialties (this is happening with increasing frequency). Perhaps we need to organize the "doctorate" nomenclature not on the basis of disciplines but rather on the basis of research problems, as is done by the USSR Academy of Sciences when classifying the basic directions of research in the natural and social sciences. In this case in order to insure that colleagues of the candidate specializing in the same areas would participate actively in assessing the proposed work, it would be suitable to make, as the object of doctorate defense, a specific substantial publication or an assemblage of the candidate's published works, and to provide extensive prior notification of the upcoming defense of these works to the scientific public.

Obviously an efficient system of regular recertification of scientific personnel must be based on administrative and legal provisions in combination with organizational, economic and political indoctrination measures. In my opinion we need to increase the number of names of scientific and scientific-pedagogical positions requiring a candidate or doctor of sciences degree as a mandatory prerequisite, and to morally and materially stimulate specialists to make the transition from scientific research to production, education and administration. This would promote the spread of scientific knowledge in the most important practical areas.

Other ways of stimulating creative activity are obviously possible as well. But all of them must insure that specialists working in science would be evaluated primarily not on the basis of degrees and titles but on the basis of the real contributions they make to accelerating scientific-technical progress.

11004
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IMPROVEMENTS IN PATENT AFFAIRS SUGGESTED

Moscow PRAVDA in Russian 18 Oct 83 p 3

[Article by doctor of physicomathematical sciences, Prof R. Rakhovskiy, Moscow: "The Expert and the Author"]

[Text] I can still remember the circumstances under which I received my first author's certificate. I submitted the claim, and about a month and a half later I was invited to what is now known as the USSR State Committee for Inventions and Discoveries. There I was met by a person whose name I remember to this day--Gur'yanov. Within an hour and a half of discussion he not only came to understand what specifically was being proposed and why it was interesting, but he also helped to refine the formula of the invention. He did this masterfully. But here is something else that was interesting: He could have done all of this without my presence, of course. And if he did invite the author, it was to demonstrate how the formula needs to be presented. This was a fabulous lesson, one from which I came to understand, besides everything else, that an invention is something that is needed not only by the author, but also by the state, and its formulation must be attacked seriously, with full responsibility.

It became apparent that such meetings were to become a regular part of my life. Sooner or later, all young specialists at the All-Union Electrical Engineering Institute imeni V. I. Lenin (VEI), in which I worked at that time, got involved in invention work. This was a credit to the enthusiastic effort of colleagues of the BRIZ [Office of Efficiency Work and Inventions]--Nadezhda Morozova and Sergey Selivanskiy. How were things organized at the VEI? If you wanted to write up a claim for an invention, you first had to describe its essence at a seminar in the laboratory. If the discussion concludes favorably, then you must defend the claim's formulation before a council of experts. After this the formula is given final approval by Morozova or Selivanskiy, and then the claim is sent to the committee. Workers of the BRIZ took on practically all of the rest of the work themselves.

With time, a superior patent library came into being at the VEI. One could go there and ask to see the card file on a particular topic, and quickly determine whether or not the given idea is really new. This makes the work much easier. And today I and many of my colleagues are often relieved of the need for traveling to the patent examination institute to seek out patents in order to answer the preliminary questions associated with submitting a claim.

I chanced to meet outstanding experts at the VNIIGPE [All-Union Scientitic Research Institute of State Patent Examination] in subsequent years as well. Several years ago a group of Moscow and Leningrad scientists, of whom I was one, proposed a new instrument. VNIIGPE expert L. Ya. Goykhman played a significant role in its patent defense. Squeezing out of all of the information that she needed, she proposed brilliant language to describe it. A large number of certificates have been earned primarily owing to the fact that she helped us. It seems to me that her share in the success of the effort is no less than that of any coauthor! After all, writing up the formula of the invention is an art, and of course it requires the qualified assistance of an expert in patents.

At one time great hopes were laid on the All-Union "Patent" Association in this aspect. It seemed that nothing could be better than to submit the formula of the claim and a description to such an orgnanization, and it would take matters to their proper conclusion. But alas, the experience demonstrated something different. The association took several thousand rubles from the institute for help on six claims, but in 3 years it never came up with anything.

Unfortunately cases of unjustified delays in formulating inventions occur rather frequently. Let me cite my own experience. Out of the 50 author's certificates that I have received, 70 percent of the claims were initially returned with a negative response. One of the experts explained this practice to me in the following way: If a claim is in fact serious, then it would be resubmitted, and if it is not serious, then the hell with it.

In general, it was very valid to provide such a preliminary examination--that is, a check to see that first of all, all of the submitted materials are filled out correctly. But this also meant additional expenses. A formally organized preliminary expert examination means a meaningless loss of time and an increase in postage expenses on both sides. In a number of cases receipt of author's certificates was delayed by 2 or 3 years. This was long enough a time period for an article to appear on the corresponding topic or for a foreign patent to be filed.

It should be considered here that to most specialists, invention work is a unique sort of hobby, and not their principal work. Thus it happens that if an invention is rejected by the preliminary expert examination, it may lie around for a month and a half before the specialist finds the time to get back to it. Then another half a year would pass before the corrections are made, the expert documents are drawn up and the invention is sent back. I think that the main objective of preliminary expert examination should be not so much control as it should be operational correction of those frequently insignificant formal errors made in claims, in the interests of the state. This obviously pertains to subsequent expert examination conducted in departments of the VNIIGPE as well.

A good tradition has recently been gaining strength in the VNIIGPE--inviting inventors in for discussions rather than corresponding with them by mail.

Thus the author now comes to the institute to defend his invention. It would seem that the expert should help him with all of the knowledge he possesses, while concurrently keeping state interests in mind. But in what sort of situation is this discussion conducted? You are led into a room in which 15 to 40 persons are working, and in just after a quarter of an hour you begin to lose tract of what the expert is trying to say and what arguments need to be presented to him. I believe that the average economic impact from introducing an invention is by far greater than the outlays that would be needed to allocate additional rooms in the VNIIGPE to permit normal work with authors.

The state receives considerable income from the activities of inventors, and it does everything it can to protect their interests. In our country, an inventor is a civil servant. Thus it is all the more unpleasant for him to have to knock on numerous doors to receive his author's reward. In this case some people look at him as a litigious person greedily reaching his hand into state pockets. The need for personal appeals and lengthy correspondence with organizations that pay out such rewards causes many authors of serious innovations of importance to the national economy to abandon this procedure, while many seekers of honorariums who are less capable but who know better "what side their bread is buttered on" throw all caution to the winds and sometimes acheive success. In particular they may include colleagues (executives usually) of the ministry and the introducing organization within the composition of the authors, even though the existing rules foresee a separate reward to persons that assist in an invention's introduction. Also frequently encountered are cases where a claim for an invention is broken down into a number of individual claims, each of which may be entitled to the maximum sum. But I will not burden the reader with a list of all of the "fully legal" means of receiving rewards.

The practice in which an inventor transforms into a private petitioner is totally incomprehensible to me. Our country has the All-Union Agency for Author's Rights (VAAP) which stands guard over the interests of composers, writers and authors of scientific monographs and which takes a certain percentage of their honorariums as a fee for this. Why should this organization (or one like it) not be given the job of protecting the rights of inventors? This would significantly simplify the procedure of obtaining rewards, and it would limit the various sorts of "fully legal" abuses in payment of honorariums, while simultaneously leaving more time to creative people for their own work.

I would like to discuss one other highly important matter--the patenting procedure. How is it organized today? It all begins with the authors themselves submitting proposals for patents on their inventions. There can be no argument that their opinion can be subjective. This is why it would apparently be best for the USSR State Committee for Inventions and Discoveries and a council of experts under this committee, consisting of prominent scientists, to select the inventions that should be patented.

At one time, possessing a patent was thought to be prestigious. In those days everything one can imagine was submitted for patents. Award the patent now,

and we'll consider the merits later! In this case people did not always remember that patents must be paid for with substantial sums of money. It was found later on that many inventions which no one wished to purchase had been placed under protection. On the other hand our real achievements are not being advertised very competently. And a wise advertisement is quite necessary to the sale of licenses and to the conclusion of advantageous business deals such as organizing joint production with some foreign company.

Comrade Yu. V. Andropov noted at the June (1983) Plenum of the CPSU Central Committee that we need to hasten development of a system of organizational, economic and moral measures which would interest both executives and workers and, of course, scientists and designers in updating technology, and make work in the old way unprofitable. As far as invention work is concerned, in my opinion we should thing about revelant measures of this sort.

Invention work must be stimulated in every way possible in the enterprises and organizations, and an atmosphere in which the fact itself of acquisition of an author's certificate is interpreted as one of the most important indicators of the successes of the corresponding subdivision, including in the socialist competition, must be created.

On the other hand we need to raise the quality of expert examination by encouraging experts with higher qualifications to participate. I would like to recall that in the USA for example, the most highly paid civil servants work in the patent office.

It is also time to improve the organization of work with authors in the VNIIGPE and the conditions under which preliminary expert examination is conducted. It must be oriented on "carrying through" as many claims as possible with the help of their authors. An expert making an unjustified rejection must bear responsibility for this. And on the other hand, in my opinion, it would make sense to reward experts who promote revelation of especially important inventions, and to pay them additional incentives when licenses are sold or international agreements involving the sale of an invention are concluded.

To improve and speed up the work of the corresponding departments of the VNIIGPE, it would be useful to broaden the practice of conducting coordination conferences. This would make it possible either to combine several claims into one more substantial one, or to arrive at new concepts.

In its effort to study the most promising directions for development of engineering and technology, the USSR State Committee for Inventions and Discoveries would profit by stimulating invention work more actively precisely in these areas.

11004
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MORE SUPPORT NEEDED TO FUNDAMENTAL RESEARCH

Moscow PRAVDA in Russian 19 Nov 83 p 3

[Article by Uzbek SSR Academy of Sciences Academician V. Popov, professor, department director, Tashkent University: "What Precedes the Introduction of an Idea"]

[Text] It seems to me that in his article "A Reference Point in the Sea of Research" (PRAVDA, 4 July), G. Lakhtin raises a number of ideas important to accelerating scientific-technical progress today. They are obvious to scientists. But are they always considered by the organizations called upon to plan the development of science?

I would like to applaud the emphasis laid in the article upon meaningful scientific research topics, and upon priority support to the development of fundamentally new ideas capable or revolutionizing and dramatically accelerating scientific-technical progress.

Tsiolkovskiy was not in fact thinking about profit when he spent his own meager assets to develop his ideas on jet engines and rocket flight. Scientists motivated by the idea of annihilating the microbes of a terrible disease by means of a weakened arsenic preparation finally came up with salvarsan as a result of the 606th attempt at its synthesis. Many such examples of stubborn and self-sacrificing scientific labor may be cited. They demonstrate how important a role is played by suggestion of a scientific hypothesis and its persistent development. A scientific discovery is not a mysterious instant of illumination but the result of active accumulation of knowledge and stubborn labor.

Thus the article's author is right when he recommends, as a means for raising the final overall effectiveness of research, organizationally separating the development of meaningful scientific ideas, which occurs primarily within the framework of academic and VUZ science, from the development and introduction of its proposals in the interests of practical necessity, which is of course easier and cheaper to do in sector and industrial scientific organizations, which possess both design offices and the conditions for creating experimental devices. When academic institutes create subsidiary production units for the introduction of more and more new ideas, they begin to resemble industrial institutes, often spreading themselves too thinly in their research effort.

Mendeleyev asserted that there are no such things as theoretical sciences and applied sciences: There are only sciences and their applications. In fact, were we not to develop fundamental research, there would be nothing to introduce into production.

"Major innovations do not arise in a vacuum. They must be preceded by great ideas and discoveries, by important inventions, by promising results of exploratory research," writes the article's author. I would like to support his conclusion: We need to single out meaningful long-range research, attaching priority to its development and providing the advantages it needs for development. Let me note that development of long-range research topics does not usually require significant outlays. What are needed are qualified, capable personnel and, of course, the latest equipment. This is an area in which we must not be stingy.

I agree with Lakhtin's assertion that the evolved system of control over applied science is "indifferent" to the meaningfulness of its work, that in formal terms all scientific research topics are of equal value to it. This pertains especially to the organization of VUZ science, even though it is the VUZs that could become, and often do become, the generators of new progressive scientific ideas and directions of inquiry. It is precisely with the VUZs that many of the first steps in the development of geology in our fatherland are associated. V. I. Vernadskiy (Moscow University) was the first to envision the enormous role to be played by atomic energy, and he organized a hunt for radioactive material back before the First World War. Unfortunately (I know this from my own experience) qualitatively new scientific syntheses, ones which even enjoy the support of specialists, sometimes remain unrealized and suppressed within the higher school.

To whom can we turn for help? I think that support to meaningful long-range research should become a topic of special concern in all organizations upon which all of this might depend. Beginning with the science departments of the party committees and including the planning organs, we must insure priority attention to the appropriate subdivisions of the research plans. It would obviously be advantageous to appoint persons in the USSR state committees for science and technology and for inventions and discoveries who would be responsible for creating the necessary conditions for preferential development of research that stands out in its possible long-range meaningfulness.

11004
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DESIGNERS WASTE EFFORT ON UNFINISHED PROJECTS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Jul 83 p 1

[Article by designer Yu. Voronov, Planning and Design Technological Institute of the USSR Ministry of Automotive Industry, Gorkiy: "The Fate of a Plan"]

[Text] Sometimes when I visit the plants I see idle machine tools, machines and even entire automatic lines in the shops. At such moments, the enormous outlays, both material and labor, invested into this equipment probably come to mind to anyone who sees such things. And I, a designer, become especially embarrassed for my colleagues. Imagine how much effort had been contributed to a given machine unit, and how many times a certain unit had to be re-designed before the sole correct and optimum solution was found. And as it turns out, all of this work is in vain.

I need not travel far for an example. A group of our designers worked for almost a year on an automatic line to assemble passenger car radiators. It was novel in that it became possible for the first time to manufacture the "filling" of the radiators not out of expensive copper but out of aluminum. The work was finished on time, and the line was sent to its client--to the city of Likhoslavl, Kalinin Oblast, to a radiator plant. We expected the new equipment to go to work right away, but it has now been half a year that the line has been standing idle. As it turns out, somebody changed something in the design of the radiators without notifying either the manufacturing plant or the equipment developers. And now the automatic line is virtually useless.

How can such things happen? It seems to me that this is something we need to think about seriously. I have now been at the drawing board for over 10 years. Our institute plans new equipment to be used in the testing of the parts, units, machine units and all brands of vehicles produced by the country's automotive industry. The design collective's task is clear--to create equipment capable of minimizing testing time. And I must say that we are not doing badly in completing this task. Most of the new equipment we have created is distinguished by high economy, it simplifies the work of people and relieves them of manual operations. Some developments have been recognized as inventions, some are exhibited at the Exhibition of the Achievements of the USSR National Economy, and some have been awarded diplomas and medals.

Despite this, however, when our designers start off on a new project they are far from always convinced that they will see the fruits of their labor embodied in metal, that the drawings will not gather dust on the shelves. And there are grounds for this. Judge for yourselves: Out of 260 units of equipment developed by the institute in the last five-year plan, only 153, or about 60 percent, were accepted by clients for industrial manufacture. This ratio has also persisted in the last 2 years of the present five-year plan. Thus we find that out of 300 of our designers, 120 are constantly working in idle gear. Need I persuade the reader that the birth of an innovation is never easy? Many days, weeks and even months pass before an idea takes the form of a concrete drawing that can be used to manufacture a machine or machine tool. And one can imagine how painful it is to recognize that this work is done for nothing, that your development is fated to languish for years before its turn comes up.

As far as I know, the designers of many other sectors are also in a similar situation. The causes are obviously different. I would like to dwell on one of them, to talk about the responsibility of the client.

Once again let me cite a concrete a situation. In response to persistent requests from the board of directors of the Kremenchug Motor Vehicle Plant 10 of our designers took on the task of creating a road-testing stand for trucks. They worked several months, with no rest because the client was impatient. And for good reason. With such a stand, all of the associated vehicle tests could be conducted inside the plant. This means that drivers need not be kept on the payroll, and no fuel would be needed. Finally the drawings of the new original project were finished. Its introduction was to produce a savings of half a million rubles in state assets. The next step was to build the stand. The plant signed a contract accepting the responsibility for this part of the work for itself. But suddenly its executives lost interest in the innovative stand. Why? It turned out that matters of greater urgency had come up at the enterprise, and the stand's introduction was postponed indefinitely. It has now been over a year that we have been trying the persuade the client to finish the work.

The root of this evil, it seems to me, lies in the fact that incidental projects of secondary importance to the enterprises often wind up in the institute's plans, which are drawn up on the basis of orders from these enterprises. In other words the clients place orders on a just-in-case basis, with the belief that what they order may come in handy some time in the future. And then, when the order is filled, matters that are in fact more urgent and important come to the forefront. What other explanation can there be for the fact that the drawings of a key rolling tool were ignored for many years at the Tutayev Diesel Machine Unit Plant? It was not until 10 years later that this tool, which allows for a wasteless part working procedure, was introduced. And the Lvov Bus Plant never did start building a vehicle road-testing stand, even though the institute provided it with all of the documents 7 years ago. And the explanation is always the same: Priority tasks crowded the stand out. But earlier, they were literally stepping on the designers' toes, hurrying them on to finish their work.

Someone may argue that there is something called contract discipline, and that its violators must bear responsibility. But the problem is that as a rule, only the developer bears this responsibility to its full degree. He gets in big trouble if an order is not filled in time. Moreover the work of the designer is now assessed on the basis of the end result, and both the moral and material incentives depend on whether his development has gone into production or is gathering dust on archive shelves. But the client enterprises are essentially not responsible for anything; it does not take much for their executives to demonstrate to the ministry that the work done by the institute could wait. In any case I do not remember even a single case of this sort in which the executives of a client plant were punished for a violation of executive discipline.

It should be considered in this case that our institute works mainly on the basis of orders from enterprises belonging to the same ministry that we do--the Ministry of Automotive Industry. One can imagine how it is for designers that have to deal with clients from other sectors! Thus it turns out that the path traveled by a new machine from development to introduction becomes impermissibly long. Is it really normal for series manufacture of an innovation to begin after 3 or 4 years? We have become accustomed to looking at this time period as optimal, but in most cases even this time period is doubled or tripled at the fault of the clients. Understandibly, the development becomes obsolete as a result, and sometimes it becomes necessary to send it back to the designers for more work. We waste not only creative effort but also state assets.

Under these conditions we find that it is not enough for a designer to know how to create new machines; he must also have a knack for ramrodding his development into the series production stage. Thus he is compelled to assume duties far afield from the creative work he is supposed to be doing: writing letters, telephoning and visiting the enterprises, requesting, reminding, prodding. The expenses of this, both material and moral, are sizable. Can a person really be satisfied with his work if he sees that it has no return, that it is of no benefit to other people? Of course not. This is why specialists quit the institute. Each year at our institute, for example, there is a 20 percent turnover among the designers. Qualified, experienced engineers leave. And while in earlier times, when I first started working at the institute, the designer's profession was felt to be a prestigious one, and college graduates flocked to the institute for work, today the picture is different. And what could we expect otherwise, when specialists encounter situations like the ones I described here everywhere they go?

The time has obviously come for the sector's leaders to turn serious attention to the state of affairs in subordinated institutes, to analyze why their developments often travel such a rocky road to production. The achievements of Soviet machine building are now better than ever before. But at the same it is no secret that the introduction of many scientific discoveries and design projects that are beneficial to the national economy still frequently collide with the irresponsibility of those for whom they are intended. Our party emphasizes that preferential and comprehensive growth of machine building and significant improvement of the machines and equipment being

produced have been and continue to be the principal directions of the development of heavy industry, of intensifying its role as a transforming factor in the expansion and fundamental renewal of the fixed capital of all sectors of the national economy. The June Plenum of the CPSU Central Committee once again emphasized the tremendous amount of work to be done in designing machines, mechanisms and production processes for both today and tomorrow. The importance of this task must be recognized by both the developers of the equipment and its manufacturers. Those who decelerate technical progress must be held strictly and fundamentally accountable. After all, discipline is what keeps everything in order, and accelerated introduction of valuable design developments into production depends upon it in many ways.

11004
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INSPECTIONS BY PEOPLES CONTROL COMMITTEES NEED IMPROVEMENT

Moscow IZVESTIYA in Russian 20 Jul 83 p 2

[Article by V. Kryuchkov, sector director, USSR Committee of Peoples Control, and B. Sokolov, committee inspector: "Created But Not Introduced. Why?"]

[Text] The June (1983) Plenum of the CPSU Central Committee demanded an increase in the effort to reveal existing reserves and raise the effectiveness of the economy by accelerating scientific-technical progress. It oriented the peoples control organs on intensifying control over the local activities of scientific, planning-design and technological organizations and enterprises. It should be noted that many committees have begun devoting more attention to the work of scientific organizations locally. Thus the results of 300 inspections dealing with the issue were examined last year.

Experience suggests that the greatest impact is achieved in integrated inspections, which permit revelation and elimination of objective and subjective causes hindering wide and fast introduction of new equipment, progressive production processes and the recommendations on scientific organization of labor into the national economy. An example of this approach can be found in the inspection of the activities of an affiliate of the Center for Scientific Organization of Labor and Control in Agriculture of the RSFSR Ministry of Agriculture (the "Rossel'khozNOPTU") by the Kirov Oblast Committee of Peoples Control. It was established that half of the planned scientific organization of labor projects had not been completed here. Plans drawn up for a number of kolkhozes and sovkhozes are not being utilized due to their poor quality. Concurrently the appearance of well-being in the introduction of completed projects was created through fabrications and distortions in the reports.

The integrity and depth of the approach to organizing the inspection made it possible to achieve elimination of the shortcomings and to improve the situation: The affiliate's employment was cut by half, its work plans are now drawn up in correspondence with orders from the farms, and fulfillment of these orders is being monitored by specialists of the oblast agricultural administration, to which the affiliate was transferred. Within a year the results of work on 40 projects were introduced into agricultural production.

In a number of cases combining the efforts of the corresponding sector divisions of the committees is found to be extremely useful in inspections.

Thus the Kazakh SSR Committee of Peoples Control checked on the work effectiveness of the "kazNIIgiprofosfor" Institute using the resources of the science, culture and public health division and the chemical and petrochemical industry division. It looked at not only the institute itself but also the Chimkent "Fosfor" Association. This made it possible to establish that the actual impact from utilizing the developments of the scientific research institute was only 255,000 rubles in 3 years, given expenses of 6.5 million rubles. About 2 million rubles were spent unproductively to correct shortcomings and mistakes made in plans. Because a gas scrubber planned by the institute is unusable, the sodium tripolyphosphate production capacities of the Chimkent association are being utilized to only half of their output.

The steps taken made it possible to raise the level of scientific-technical research, to strengthen the scientific research institute's material-technical base, to put an end to unpromising projects and to reduce the time it takes to introduce completed developments. The actual impact from their utilization in industry exceeded 1 million rubles last year.

Intensification of control over the activities of scientific-production associations, the job of which is to reduce the time it takes to create the latest models of machinery, equipment, instruments and materials and to put them into production, is acquiring great significance under today's conditions. So that they can perform their task, scientific, planning and design organizations and experimental industrial enterprises have been included within the composition of these associations. But inspections of the work of some of them have shown that the time it takes to put new models of equipment into production is not decreasing. A large number of completed developments are not finding practical uses. The technical-economic indicators of the products of the enterprises of a number of associations are inconsistent with the highest achievements of Soviet and foreign science and technology.

This situation is in many ways the consequence of the fact that scientific design and production subunits of the scientific-production associations are working in isolation, not as members of a single scientific-production and economic complex. Contrary to the requirements of the government-approved "Standard Statute on the Scientific-Production Association," enterprises and scientific research institutes contained within the structure of the associations continue to maintain economic and legal independence, the assignments they work on do not fit within the range of subjects established for them prior to their inclusion in the association, and they take too long to reorganize to produce new products.

For example in 6 years the "Vetroen" Scientific-Production Association of the USSR Ministry of Land Reclamation and Water Resources has not created a single working wind power unit. Almost 80 percent of the output capacity of the experimental plant attached to this association is being devoted to the production of wooden homes. It was not until an inspection was conducted that scientific and design subdivisions of the association initiated work on equipment necessary to make production tests on the operating characteristics of the wind machines put out by the association.

The constant attention of city, rayon and plant committees of peoples control toward the introduction of the achievements of science into production is producing good results. Thus inspectors of Dnepropetrovsk Oblast promoted the creation of 156 mechanized flow lines and automatic lines, the modernization of over 1,850 units of production equipment, and the full mechanization and automation of over 100 sections and shops. Steps were taken to improve the use of new equipment as a result of an inspection of the "Krivorozhagloстroy" Trust conducted by the Inguletskiy Rayon Committee of Peoples Control in Dneptopetrovsk Oblast. This made it possible to raise the labor productivity of the builders and achieve an economic impact of 100,000 rubles.

Inspecting the activities of scientific-production associations and of scientific, design and technological organizations, we must try to raise the effectiveness with which the financial and material resources allocated to them are utilized. The Uzbek SSR Committee of Peoples Control established that the level of scientific developments was not in keeping with the needs of the national economy at the All-Union Scientific Research Institute of Cotton Growing. It imposed deductions for unauthorized expenditures upon the executives of the All-Union Scientific Research Institute of Cotton Growing. They illegally maintained unauthorized production units and overspent the wage fund.

Intervention of the Samarkand Oblast committee put a stop to the irregular practice of illegally overpaying rewards to the authors of efficiency proposals in the Uzbek SSR Scientific Research Institute of Veterinary Medicine. The director of the experimental-production farm, the director of the patent and license research laboratory and other officials returned to the state 1,600 rubles that they had received illegally.

An invariable condition of effective inspections is proper determination, by the committees, of the degree of responsibility borne by officials. This condition is not always observed. Thus in an inspection of work done in response to its resolution "On the Results of an Inspection of Fulfillment of Plans for Introducing New Equipment in Construction Organizations of the 'Tashauzsel'stroy' Trust" the Tashauz Oblast Committee established that many of the shortcomings had not been eliminated. Trust executives and the concerned divisions continued to exercise poor control over effective introduction of the achievements of science and technology into production. The absence of proper attention was one of the main reasons why the trust failed its quota for economization of construction materials. Noting that work on the resolution was unsatisfactory, the committee felt it possible to limit its action to publicly reprimanding the trust's chief engineer. Such a liberal decision by the committee would hardly change the attitude of the trust's executives toward introducing new equipment into subordinated construction organizations.

The problems associated with intensifying control in science and in scientific-technical progress demand constant enquiry, the use of scientists, specialists and qualified workers in inspection teams, and more active work by the peoples control groups and posts of the scientific institutions and enterprises participating directly in the creation and use of new equipment. Only under these conditions can success be achieved.

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ESTONIAN PLANNING-TECHNOLOGICAL AND ARTISTIC-DESIGNING INSTITUTE PROFILED

Tallinn SOVETSKAYA ESTONIYA in Russian 6 Oct 83 p 2

[Article by R. Sepman, director of Planning-Technological and Artistic-Designing Institute, Ministry of Local Industry, ESSR: "Accelerating Rates"]

> [Text] Today's, 47th edition of the page, "From Idea to Introduction" is devoted to the work of the Planning-Technological and Artistic-Designing Institute of the ESSR Ministry of Local Industry and its individual subdivisions. In recent years, the collective of this institute has achieved certain successes in accelerating the rates of scientific and technical progress and of introduction of new modern developments, and first of all, of consumer goods. The institute also includes the "EFFEKT" SKTB [special designing and technological office]--an organization created three years ago and called upon to assist in the introduction of inventions and achievements of science and technology into the national economy.

The Planning-Technological and Artistic-Designing Institute of the ESSR's Ministry of Local Industry is one of the links in the chain which connects science with production. Its main purpose is the acceleration of scientific and technical progress at the enterprises of local industry to increase the production of consumer goods and raise their quality.

Each year, the institute's designers design about 200 items for molds, equipment, and stamps to update the products of the ministry's enterprises. This equipment should be technologically effective, that is, its manufacture and subsequent operation should correspond to the technical capabilities of the enterprises and, at the same time, ensure a stable level of product quality and a rise in the productivity of labor. The manufacture of equipment is important and labor-intensive. To satisfy these and other requirements the institute's specialists have developed more than 20 state standards for molds.

Specialists have done considerable work for the production of new types of consumer goods. Thus, the production of bioactive granulated detergents was planned and put into operation for the first time in our country in the "Flora" association. This work won the ESSR state prize for 1982. There, at "Flora," the production of facade paints has been mastered in collaboration with our specialists, The production of an electric lawnmowers has been begun at "Vazar."

Designers A. Nikitin, Ye. Redayas, and Ye. Oteyan developed the plan in a short time and the enterprises manufactured the test model, necessary tests were conducted jointly, and documentation for technical standardization was approved. Series production of the new product was set up in less than three years with the close collaboration of the designers and production workers.

Many of our developments are directed toward the mechanization and automation of technological processes and the organization of production. We try to have an integrated approach to the solution of problems, that is, to analyze the entire technological cycle, and only then to make a decision. This is how they proceeded, for example, in mechanizing the production of orchard and garden equipment in the "Vazar" association when creating tools and equipment for machining and creating paint and varnish coatings and so forth. This is to the credit of such of our engineers as E. Khuul (department chief), Kh. Meresmaa, Yu. Urvik, and A. Nelling.

The economical consumption of materials and raw materials depends to a great extent on their storage and stockpiling. Warehouse facilities have been received for operation in accordance with the institute's plans in the "Flora," "Vazar," and other associations. More than 60 prefabricated metal buildings have been constructed and tied to the local conditions of the ministry's enterprises and problems in the mechanization of materials handling have been solved.

In the storage and shipment of materials and finished products considerable expenditures go for packaging and containers. On recommendations of the institute, the production and employment of heat-shrinking films which can be used for packing some articles has been begun, as a result of which wooden containers in short supply and corrugated cardboard will be saved. They permit mechanizing the shipment of materials and products developed by the institute and soft straps produced at "Vazar." In this connection, I should like to mention the initiative of the institute's specialists, L. Groyg, A. Unta, and A. Shishkova.

The decisive sector of scientific and technical progress is precisely the introduction of the achievements of science and technology into production. Beginning in 1980, this role has been accomplished by the SKTB "Effekt" which is part of the institute. The office aimed for the mechanization and automation of production and raising the productivity of labor through the introduction of inventions and other achievements of science and technology. We can note the work on robotization of technological processes and the design and manufacture of a test robot complex for stamping parts. Work is continuing on the creation of a robotized line and the possibilities of the wider use of robots at enterprises of local industry are being studied with the goal of raising the productivity of labor, improving its conditions, and freeing workers. The "Effekt" SKTB also fills orders of other enterprises for the introduction of inventions and the latest achievements of science and technology. However, for the present there are not sufficient capacities to satisfy all our requirements and needs and those of the republic's other enterprises. Preparatory planning work has been begun on expanding the experimental base, the construction of which is planned in the 12th Five-Year Plan.

Specialists of the institute have also taken part in the drawing up of republic special-purpose programs and are the leading developers of the special-purpose

integrated program, "The use of local and secondary raw materials in the national economy of the ESSR and the production of consumer goods." The institute is the base organization in the country for standardization of a number of groups of products and the developer of a branch quality control system for republic ministries.

In speaking of our problems, we should stress first of all that the designer's work does not stop with the turning over of blueprints to the client. The institute's specialist is called upon to maintain close ties with the technical services of those enterprises at which the plan which he has worked out is being introduced, accomplishing author's supervision of the introduction. I mention this because the point of view is nevertheless current among some: my business is the elaboration of the plan, and that alone. An incorrect position--the institute is also responsible for the introduction of the innovation.

We complain at times: there are not sufficient competent specialists for organizations such as ours. The young ones do not have sufficient experience, and years are spent to train a specialist within the walls of a planning institute. We are trying to solve the problem through our own efforts. For these purposes we invite students from the Tallinn Polytechnical Institute [TPI]--future mechanical engineers--to come to us for training. In addition, by arrangement with the department of machine-building technology of TPI we assign contract work to the students, in particular on the subject of robot technology. You look, and on completion of TPI such a graduate has already become familiar with the acquired profession and in our institute he can be assigned independent work.

Our institute, so to say, is a multibranch institute. Of course, it is impossible for each specialist to be a Solomon. Therefore, we should strengthen ties with specialized organizations which are engaged, for example, on problems in the production of plastics, packaging and containers, traffic safety on the roads, and so forth. In short, we should be abreast of where and in what institute or other specialized organization we can obtain qualified information so that our own studies meet the most contemporary requirements.

And the main task is the development and assistance in the production of new, high-quality consumer goods. And that is why the plans which emerge from the walls of the institute should ensure to an even higher degree the introduction of highly effective combined measures for the technical development of the branch which are based on advanced Soviet and foreign experience.

6367
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COMPUTER DEVELOPMENTS AT INSTITUTE OF AUTOMATION AND ELECTROMETRY DESCRIBED

Moscow IZVESTIYA in Russian 17 Sep 83 p 2

[Article by IZVESTIYA special correspondent B. Konovalov: "A Computer at Every Work Place"]

[Text] Novosibirsk--Three years ago an unusual building with its metallic glitter making it so different from the traditional brick buildings on Lavrent'yev Prospect, was constructed in Novosibirsk's Akademgorodok. At first everything proceeded normally at this construction site: the bulldozers swarmed about, the concrete was poured in the underground section. And then, a prefabricated metal structure was quickly rose up.

At this construction site the mighty "Sibakademstroy" was represented only by a works superintendent and two technicians. The remainder of the labor force was made up of associates from the laboratories of the Institute of Automation and Electrometry. The subjects handled at the institute are now especially important for the country, and the scientists did not, therefore, want to wait any longer for the "favors of the construction workers."

"In all general, we created about 3,000 square meters of specialized production areas in only 5 months virtually with our bare hands," the director of the institute, academician Yuriy Yefremovich Nesterikhin told me with undisguised pride as he pointed toward the new building. "The underground storey is given over completely to optics and laser laboratories and computer-controlled technological installations. The powerful machines of the "Ryad" system are located above in the center of the hall. And on the periphery, around this 'computer center,' there are various laboratories. This design was selected for the building in order to bring the specialists closer to the computers."

I watched the developers of the electronic units as they worked. Automated work places have been created for them.

First, a basic logic circuit is sketched out with a pencil. Then, when it has been selected, the designer goes to his automated work place, to the "Planshet" system, the name given to the plotter-coder.

In essence, this is the toolbox of the designer in the age of electronics. A spherical handle mounted in the center of a plastic rectangle can be moved

easily in any direction with the aid of wires that the designer uses to draw an outline. The computer codes his actions. When the work is completed, simply by pressing a button the designer switches the computer into output mode. And now the computer itself draws the blueprint conceived by the designer onto a fresh sheet. All that has to be done is to check to make sure that the computer has "understood" it correctly. The blueprint is then stored in the computer.

At the automated work place for the radio engineers, who must translate this into technological language, the circuit is put on a display screen similar to a color television receiver. Beneath the screen there is a keyboard, just like a regular typewriter. Using this the engineer can conduct a dialogue with the computer in a special mathematical language or in plain, ordinary language that anyone can understand. By depressing keys to move a white spot on the circuit the engineer gives the computer instructions: this end of the wire must be connected to a particular point. The computer itself selects the shortest distance.

When the stage of fabrication is reached, some work, for example, drilling holes for connecting wires and the operation of a numerically controlled machine tool, is done automatically, subordinate to computer commands, which are guided by the blueprint stored in the memory.

The finished electronic unit is returned to the designer for checking and adjustment. This is rarely successful the first time. Having discovered an error, the engineer again sits at the display screen. He depresses the necessary keys, switches to "edit" mode and makes the corrections to the image...

Here man and computer interact in the work process. At any given moment the engineer can tell the computer what he wants done. Not so long ago it was thought that everyone would input his tasks to powerful computer centers, while the mathematicians would solve the problems and provide the answers. But the highway to automation has turned out to be different. Now they are trying to achieve a situation in which each specialist--the scientist, the engineer, the designer, the technologist--can make use of the services of a computer at his own work place. Speaking metaphorically, he does not have to go to the computer center for water, because he has a water supply. All that he needs to to is turn on the faucet and use it.

At the institute he uses automated technology primarily for designing automated systems for scientific research and industrial processes using models of the CAMAC international standard. The people in Novosibirsk were among the first pioneers in this effective avenue of automation.

The power of CAMAC lies in the fact that it makes it possible to switch the development of automated systems onto industrial lines. To use construction terms, it is the principle of modular construction. First a powerful "house-building combine" is set up to produce standard functional units from which the most diverse kinds of automated systems can quickly be built depending on specific requirements. For example, numerically controlled machine tools for handling technological processes and various kinds of test operations,

and instruments, units and machines for data processing in any kind of scientific experiment.

The standardized mainline data exchange system developed at the institute makes it possible to link CAMAC with any computer and use its facilities for data handling or processing. The electronics industry is now expandings its output of microprocessors. In particular, the compact "Elektronika-60" machine enjoys great popularity. The Novosibirsk people now make extensive use of it for their systems by linking it with CAMAC. A hybrid system has been developed--MIKRO-CAMAC-LAB--that plays the role of a personal laboratory computer.

The institute is gearing up to produce a complex for automating vibration-acoustical testing, which is done very extensively. A compact system called "Yenisey" enables analysis of signals from 64 sensors. During testing data are displayed visually on a normal television receiver. Test data are printed on paper in digital and graphic form. One such instrument now costs about $250,000 in the world market. And they pay this so that the labor productivity of testing personnel can be improved. Accelerating work rates is an expensive business.

In any modern automation system the data bank is of great importance. At the Institute of Automation and Electrometry a laser archive memory has been developed for long-term data storage. It comprises a carousel in which discs measuring 70 x 70 millimeters are stacked vertically. Some 6,000 pages of text are recorded on each disc in holographic form. The 288 discs making up the "carousel" can replace an entire film library. The "catalogue" is stored in a minicomputer which controls the operation of this data bank. When instructed it can select a required disc, studded with the dark dots in which the archive data are coded, and an automatic device sets it up for display. A laser light shone on the disc reconstructs text and provides visual displays from the dots.

What distinguishes the laser library from a regular library is that here, text is reconstructed on a television screen. It can be read and copies can be made either by using a printout or photographing the screen.

In contrast to magnetic storage devices, the laser memory is unaffected by electrical or magnetic fields. Its sphere of application can be enormous. The entire contents of the Lenin Library can be stored in one room! Obviously, the first things to be stored in the laser memory will be scientific and technical and patent libraries and sector data banks. Storing design and technical documentation, the documents of the standarization service, space research archives and criminal records--this is a far from complete list of the fields where the long-term laser memory can be used.

Together with the Novosibirsk instrument making plant the institute is now making the final adjustments to an industrial version of the laser memory.

But by no means all cooperation with industry always goes successfully. Thus, the plotter-coder that we spoke about earlier, which can operate at a speed of 1.5-2 meters per second, was developed as long ago as 1978.

A special interdepartmental commission noted its value for rapid outline drawings. It is three times more productive than all similar systems available to us at present and would find extensive application, but series production has still not been started. Many people come and show an interest in it: how, they say, can we purchase one? But, of course, the institute is not a plant.

Finally some enthusiasts turned up on the scene and they set about copying it. They were from one of the sector special design bureaus. But there they were instructed to switch the development to the system of standards in force within that administration, and so the special design bureau has now been working on this for 18 months. Meanwhile, the CAMAC standard was adopted as a state standard as long ago as 1979.

Unfortunately, CAMAC is still experiencing difficulty in penetrating into the industrial ministries. Each ministry has established its own standards for electronics. And in order to switch from the rails of one administration to the rails of another it is necessary to change the "wheels," just like on trains when they cross our border. But here we are talking about ministries located on our country's territory. And whereas it takes a couple of hours to change the wheels, several years are lost in changing from one standard to another. Moreover, many ministries often create one-of-a-kind automated systems according to individual designs in order to solve particular problems, rather than standard systems using the modular construction principle, as is done with the CAMAC standard.

It was stressed at the CPSU Central Committee June (1983) Plenum that decisive significance now attaches to a unified scientific and technical policy. And obviously, the "rails" for all developments in automation should be of the same size.

According to some assessments, about one-sixth of the total increase in labor productivity throughout the world is now achieved through the use of computers. The scientific organizations actively engaged in the development of these systems therefore acquire special value. And it is important to create conditions for the development of their initiative and enterprise. Unfortunately, the truly gigantic intellectual possibilities of the academic institutes working in this field are still being poorly utilized.

"We strive constantly to break through closer to production, to drive a main highway into industry," academician Nesterikhin says. "For this purpose two interdepartmental design sections were set up 10 years in the industrial sectors. We sent our associates there and helped to set up these sections. But they very rapidly lost their interdepartmental nature and began to be loaded with sector tasks. One was simply converted into a sector institute. We still cooperate with them but production has now been removed one barrier further away from us.

"This is the situation that we have now. The institute conducts its scientific research work from the budget (and this is scarcely enough to pay the wages) and the several million rubles it obtains each year from economic contracts.

The special design bureau for scientific instrument making in our Novosibirsk branch provides documentation for us worth R1 million. And the experimental plant manufactures devices for the institute to the tune of a mere R80,000!

"We must be granted permission to set up a scientific-technical association on an experimental basis. It is essential to subordinate the special design bureau for scientific instrument making totally to the institute (at present we exercise only scientific leadership) and set up production to manufacture small-series batches of automated systems. Then we would be able to offer the sector institutes and industry models that have undergone testing for large-scale series production."

The situation at the Institute of Automation and Electrometry is typical for the Academy of Sciences. If the academy institutes are looked at through the entire chain (science--design bureau--test production) we see a sharply inverted pyramid. It is only for the scientific and technical firms like the Ukrainian SSR Academy of Sciences Institute of Electric Welding imeni O.Ye. Paton, which makes an enormous contribution to the national economy, that this "pyramid" seems normal: in addition to the design bureau there are three plants. But the institutes of the Novosibirsk scientific center are all squeezed together in only one experimental plant, a situation that is manifestly abnormal. It is like an organism whose head--science--is overdeveloped, while it has a small body--the design bureau--and puny legs--production. And, of course, like people, institutes must be balanced.

In the recent CPSU Central Committee and USSR Council of Ministers decree "On Measures To Accelerate Scientific and Technical Progress in the National Economy" provision is made for the rapid creation and equipping of test and experimental bases and production facilities. And this, evidently, should affect first and foremost the collectives working in the most up-to-date and promising directions of scientific and technical progress.

At the Institute of Automation and Electrometry there are many most interesting and important developments that are still awaiting realization. Here, an aggregate of technologies that in industry has been split among many sectors has been gathered together under the one roof. There is enthusiasm and a desire to be useful to the country, today not tomorrow. And the USSR State Committee for Science and Technology must support the initiative of the institute and help to create a scientific-technical association that will accelerate the process of automation in many sectors of the national economy.

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KOMSOMOL PRIZES IN SCIENCE AND TECHNOLOGY AWARDED

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 29 Oct 83 p 4

[Text] The Bureau of the Komsomol Central Committee, having reviewed the suggestions made by the Komsomol Central Committee's Commission for Komsomol Prizes in Science and Technology, decrees that the following young scientists and specialists in the national economy be awarded the 1983 Komsomol Prize:

1. Abdurakhmanov, Rustambek Ubaydullayevich, docent; Yuldashev, Abdurakhim Temirovich, senior scientific associate; and Bor, Al'fred Rayngol'dovich, lecturer; all candidates of technical sciences; Abdurakhimov, Abdudzhabba Abdusalamovich and Panchenko, Yakov Aleksandrovich, both graduate students; and Saidov, Rustam Mannapovich, lecturer; they are associates of Tashkent Polytechnical Institute; and Belyanin, Vladimir Petrovich, senior engineer at the Aviation Materials All-Union Scientific Research Institute; for the research, development, and incorporation of physical and metallurgical methods for altering construction materials during welding.

2. Akimov, Boris Aleksandrovich, senior scientific associate; Ryabova, Lyudmila Ivanovna, junior scientific associate at Moscow State University imeni M. V. Lomonosov; Vigman, Pavel Borisovich, junior scientific associate at the Theoretical Physics Institute of the USSR Academy of Sciences; Nemov, Sergey Aleksandrovich, junior scientific associate at Leningrad Polytechnical Institute; Pankratov, Oleg Aleksandrovich, senior scientific associate at the Applied Physics Scientific Research Institute; and Ragmilova, Tamilla Shamsi kyzy, junior scientific associate at the Physics Institute of the AzSSR Academy of Sciences; all are candidates of physical and mathematical sciences; for theoretical and experimental research on admixed electron states in a solid.

3. Anderzhanov, Akhmet Letfullovich, senior scientific associate at the Moscow Agricultural Production Engineering Institute imeni V. P. Goryachkin; Bashilov, Aleksey Mikhaylovich, junior scientific associate; and Starovoytov, Viktor Ivanovich, senior scientific associate; they are candidates of technical sciences and associates of the Potato Farming Scientific Research Institute; for research on, development and incorporation of systems for quality control, automated processing of low-grade produce in production processes, and for storage and marketing of potatoes, fruit, and vegetables.

4. Antonenkov, Vasiliy Danilovich, senior scientific associate at the General and Legal Psychiatry All-Union Scientific Research Institute imeni V. P.

Serbskiy; and Kuznetsov, Dmitriy Anatol'yevich, junior scientific associate at Moscow Medical Institute No 1 imeni I. M. Sechenov; candidates of biological sciences; Musayev, Pasha Isamail ogly, lecturer at the Azerbaijan Medical Institute; and Razumova, Irina Yur'yevna, junior scientific associate at Moscow State Medical Institute No 2 imeni N. I. Pirogov; candidates of medical sciences; and Novikova, Lyubov' Anatol'yevna, lecturer at Voronezh Medical Institute; for the development and incorporation of new research methods in experimental and clinical medicine.

5. Afanas'yev, Vyacheslav Alekseyevich, industrial equipment adjuster; Gudkov, Vladimir Alekseyevich; Dukhnovskiy, Mikhail Petrovich; Trusova, Svetlana Gerasimovna; Petrovnin, Nikolay Mikhaylovich; and Yakovlev, Sergey Vladislavovich; senior engineers; Lednev, Mikhail Aleksandrovich; and Yudina, Natal'ya Vasil'yevna, engineers and associates of a scientific research institute; and Nidayev, Yevgeniy Vasil'yevich, candidate of physical and mathematical sciences and junior scientific associate at the Semiconductor Physics Institute of the Siberian Department of the USSR Academy of Science; for a series of studies on the research, development, and incorporation of methods and equipment for impulse tempering of semiconductor structures using intensive noncoherent light sources.

6. Baranovskiy, Vladimir Georgiyevich, candidate of historical sciences; and Kapelyushnikov, Rostislav Isaakovich, candidate of economic sciences; senior researchers at the World Economics and International Relations Institute of the USSR Academy of Sciences; and Momdzhan, Aleksandra Vasil'yevna, candidate of philosophical sciences and senior scientific associate at the Philosophy Institute of the USSR Academy of Sciences; for a series of research studies on philosophical, social, and economic problems in the contemporary ideological and political struggle and criticism of bourgeois concepts of social development.

7. Bashkirov, Vladimir Ivanovich; and Lakomova, Natal'ya Mikhaylovna; candidates of biological sciences; Glumova, Yekaterina Filimonovna and Poluektova, Yelena Urlikhovna; junior scientific associates at the General Genetics Institute of the USSR Academy of Sciences; Malkov, Sergey Viktorovich, junior scientific associate at Kazan University; and Surikov, Nikolay Nikolayevich, candidate of biological sciences and junior scientific associate at the Antiplagues All-Union Scientific Research Institute; for the series of studies "A Study of the Genetics of Plasmids in Bacilli".

8. Belyayev, Andrey Alekseyevich; and Shapovalov, Aleksey Mikhaylovich; junior scientific associates at the Central Scientific Research Laboratory of the USSR Ministry of Health; and Polivoda, Mikhail Dmitriyevich, junior scientific associate at the Central Scientific Research Institute of Moscow State Medical Institute No 2 imeni N. I. Pirogov; candidates of medical sciences; for their work "The Use of Laser Photocoagulation in Endoscopic Surgery".

9. Buzun, Igor' Leonidovich; and Volodarskiy, Vladimir Vasil'yevich; group chiefs; Lyzhin, Valeriy Alekseyevich, laboratory director; Pliskanovskiy, Aleksandr Stanislavovich, deputy shop director; and Kotel'nikov, Leonid Alekseyevich, machinist; associates of the Zhdanov "Azovstal'" [Azov Steel] Metallurgical Plant; Litvinenko, Yevgeniy Fedorovich, candidate of technical

sciences and senior scientific associate of the Ferrous Metals Central Scientific Research Institute imeni Bardin; and Levin, Dmitriy Yur'yevich, group chief at the Ferrous Metallurgy Institute; for the development and incorporation of a complex process for producing low-alloy steel for northern gas and oil pipelines.

10. Volkogonov, Dmitriy Antonovich, doctor of philosophical sciences and professor at the Military and Political Academy imeni V. I. Lenin; Miroshnichenko, Valentin Aleksandrovich, doctor of philosophical sciences and professor at Tula Polytechnical Institute; Mikhaylovskiy, Ivan Nikolayevich;, doctor of historical sciences and professor at Lvov Polytechnical Institute imeni Leninist Komsomol; Slepenkov, Ivan Markelovich, doctor of philosophical sciences and professor at Moscow State University imeni M. V. Lomonosov; Traynin, Aleksandr Solomonovich, doctor of historical sciences and professor at the Higher Komsomol School under the Komsomol Central Committee; Filippov, Fridrikh Rafailovich, doctor of philosophical sciences and professor at the Sociological Research Institute of the USSR Academy of Sciences; and Khoze, Samuil Yefimovich, candidate of pedagogical sciences and senior scientific assoiciate at the General Problems of Education Scientific Research Institute of the Academy of Pedagogical Sciences; for the series of research studies on the problems of youth, history, and the contemporary activities of the Komsomol.

11. Gorodnichev, Aleksandr Ivanovich, Komsomol committee secretary; Gromov, Sergey Valer'yevich, manufacturing engineer; Fedokseyev, Vladimir Nikolayevich, mold operator; Kharakhnin, Andrey Dmitriyevich, electrical fitter; Krasil'nikov, Sergey Erikovich and Chudnenko, Yevgeniy Borisovich; design engineers; Skryabin, Anatoliy Ivanovich, pattern maker; and Fedoseyenko, Igor' Vasil'yevich, chief designer; associates of the Ivanovo Machine Tool Building Production Association imeni 50th Anniversary of the USSR; for the creation and incorporation into industry of a single-design multi-use machine tool with numerical programmed control.

12. Zorin, Vladimir Viktorovich; Pastushenko, Yevgeniy Valeriyevich; Safiyev, Oleg Ganiyatovich; Romanov, Nikolay Aleksandrovich; and Chalova, Ol'ga Borisovna; senior scientific associates at the Ufa Petroleum Institute; Rodin, Aleksandr Petrovich, senior specialist on the Higher Certification Commission of the USSR Council of Ministers; and Tagiyev, Delgam Babir ogly, senior scientific associate at the Inorganic and Physical Chemistry Institute of the AzSSR Academy of Sciences; candidates of chemical sciences; for developing the scientific foundations and new processing methods for obtaining oxygen-containing compounds, monomers, and reagents for use in the chemical and petrochemical industries.

13. Kartsev, Viktor Georgiyevich, senior scientific associate; Sipyagin, Aleksey Mikhaylovich; Nabatov, Aleksey Sergeyevich; and Pokidova, Tamara Sergeyevna; junior scientific associates in a department of the Chemical Physics Institute of the USSR Academy of Sciences; and Lebedev, Al'bert Tarasovich, junior scientific associate at Moscow State University imeni M. V. Lomonosov; candidates of chemical sciences; Potemkin, Aleksandr Vladimirovich, candidate of technical sciences and junior scientific associate; and Loshchenov, Viktor Borisovich, candidate of physical and mathematical sciences

and junior scientific associate; associates of the General and Inorganic Chemistry Institute; Dorozhkin, Leonid Mikhaylovich, candidate of physical and mathematical sciences and junior scientific associate at the Organic Semi-Products and Dyes Scientific Research Institute; Shestakov, Aleksandr Valentinovich, candidate of physical and mathematical sciences and junior scientific associate; and Gordina, Lyubov' Sergeyevna, candidate of technical sciences and senior scientific associate; scientific research institute staff members; for the development of chemical processes for obtaining new materials for electronics, photography, and medicine.

14. Nazirov, Ravil' Ravil'yevich, candidate of technical sciences; Pivovarov, Mikhail Leonidovich, candidate of physical and mathematical sciences; and Tikhonov, Andrey Anatol'yevich; junior scientific associates; Chistyakova, Yelena Alekseyevna, senior laboratory technician; associates of the Space Research Institute of the USSR Academy of Sciences; Sorokin, Aleksey Maksimovich, junior scientific associate; and Zhukov, Viktor Nikolayevich, group chief; associates of the coordinating and computing center; Vereshchetin, Vladimir Viktorovich, junior scientific associate of the Astronomy Council of the USSR Academy of Sciences; Filikov, Sergey Vladimirovich, electronic computer director at the Simeiz Experimental Station of the Astronomy Council of the USSR Academy of Sciences; Vradiyy, Valentin Ivanovich, shift chief at the command and measurement complex; and Zarin'sh, Ansis Yanovich, graduate student at the Latvian State University; for the development and incorporation of methods for high-precision navigational control of experiments conducted with the aid of automated satellites.

15. Novitskiy, Zinoviy Bogdanovich, candidate of agricultural sciences; Botman, Yevgeniy Konstantinovich; Bozhko, Petr Viktorovich; and Mamedov, Perman; senior scientific associates; Abitova, Shaziya Yusufovna and Vinogradov, Mikhail Borisovich, junior scientific associates; associates of the Central Asian Forestry Scientific Research Institute; for the study on "The Role of Forests in Soil Protection and Increasing Soil Productivity".

16. Orazov, Mered Bayramovich, doctor of physical and mathematical sciences and department chief at the Turkmen National Economics Institute; and Tarlakovskiy, Dmitriy Valentinovich, candidate of physical and mathematical sciences and senior instructor at Moscow Aviation Institute imeni S. Ordzhonikidze; for the series of studies on "The Application of the Theory of Differential Operators in Mechanics".

17. Solomein, Nikolay Yur'yevich and Volkova, Nadezhda Ivanovna, group chiefs; Bogdanov, Nikolay Mikhaylovich, chief engineer; Vaynbender, Aleksandr Genrikhovich, party chief; Gavrilovskaya, Galina Vladimirovna; and Lintser, Aleksandr Anatol'yevich, senior scientific associates; Martynyuk, Nadezhda Petrovna; Negomedzyanov, Azat Akhmedovich; and Chiryat'yeva, Alla Leonidovna; junior scientific associates; and Silina, Lyudmila Dmitriyevna, engineer; associates of the Petroleum and Gas Industry Scientific Research and Planning Institute imeni V. I. Muravlenko; for developing a complex of progressive scientific and technical solutions for the construction of petroleum industry highways in Western Siberia.

18. Sushkov, Oleg Petrovich and Flambaum, Viktor Vil'yevich, candidates of physical and mathematical sciences and senior scientific associates at the Nuclear Physics Institute of the Siberian Department of the USSR Academy of Sciences; Petukhov, Aleksandr Kuz'mich, junior scientific associate at the Leningrad Nuclear Physics Institute of the USSR Academy of Sciences; and Titov, Nikita Andreyevich, junior scientific associate at the Nuclear Research Institute of the USSR Academy of Sciences; for the series of studies on "The Destruction of Spatial Parity in Heavy Nuclei".

19. Khavrotin, Georgiy Pavlovich and Kraynev, Boris Anatol'yevich, candidates of technical sciences and junior scientific associates; Seleznev, Vladimir Nikolayevich, engineer; Sharov, Aleksandr Petrovich, junior scientific associate; and Myasoyedov, Nikolay Viktorovich, group chief; associates of the Halurgy All-Union Scientific Research and Planning Institute; and Kupriyanov, Vladimir Dmitriyevich; lecturer at the Leningrad Mining Institute; for the study, development, and incorporation of new methods and means for improving ventilation and labor safety practices in potassium mines.

Also receiving the 1983 Komsomol Prize: the "Iskatel'" [Searcher] small Academy of Sciences in Crimean Oblast, UkSSR; the "Viitorul" republic scientific society in the Moldavian SSR; the school of natural sciences under the Atomic Energy Institute imeni I. V. Kurchatov; and the young people's geological expedition in Sverdlovsk Oblast; for their extensive work in the communist education of young people and in developing scientific and technical creativity among students.

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UzSSR STATE PRIZES IN SCIENCE AND TECHNOLOGY AWARDED

Tashkent PRAVDA VOSTOKA in Russian 6 Nov 83 p 3

[Text] Having reviewed the report made by the Committee for UzSSR State Prizes imeni Beruni in Science and Technology, the CPUz Central Committee and the UzSSR Council of Ministers have decreed:

To award the 1983 Uzbek SSR State Prizes imeni Beruni to:

1. Atakhodzhayev, Akbar Kasymovich; Gulamov, Kadyr Gafurovich; Musakhanov Mirzayusup Mirzamakhmudovich; Sabirov, Leonard; Fabelinskiy, Immanuil Lazarevich; Chernov, Gilley Mordukhovich; Yuldashev, Anvar Artykovich; and Yuldashev, Bekhzad Sadykovich; for a series of fundamental research studies on the physics of the interaction of leptons and adrons with atomic nuclei and optical radiation with matter.

2. Abdukadyrov, Achilbay (director); Antonov, Viktor Aleksandrovich; Atlanov, Aleksey Loginovich; Grachev, Lev Alekseyevich; Karnaukhov, Nikolay Ivanovich; Lapshin, Nikolay Denisovich; Li, Prokofiy (posthumously); and Miftakhov, Shamil' Fatykhov; for research on, development and incorporation of the KU-0.2 all-purpose harvesting combine and development of a new processing method for kenaf production.

3. Rashidov, Tursunbay (director); Ishankhodzhayev, Abdurakhman Asimovich; Mardonov, Batirzhan; Mubarakov, Yarmukhamed Nurupovich; Omel'yanko, Valentina Alekseyevna; and Khozhmetov, Gaibnazar Khadiyevich; for a series of studies on the development and incorporation of a seismodynamic theory for underground structures.

4. Aripov, Uktam Aripovich (director); Arustamov, Dmitriy L'vovich; Barskaya, Galina Abramovna; Pak, Nikolay Petrovich; Petrov, Rem Viktorovich; Urazmetov, Kasim Gandalifovich; Khaitov, Rakhim Musayevich; and Khikmatullayev, Saidulla Nigmatullayevich; for the development and incorporation of new methods for treating chronic kidney insufficiency.

5. Nurmukhamedov, Marat Koptleuich (director); Allayarov, Sultamurat; Bayniyazov, Kyrykbay; Bakhadyrova, Sarygul'; Mambetniyazov, Turdybay; Nasrullayev, Abdreym; Niyetullayev, Sagynbay; and Ul'yashov, Pavel Sergeyevich; for a history of Kara-Kalpak Soviet literature.

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EFFECTIVENESS OF TAJIK ACADEMY OF SCIENCES ECONOMIC CONTRACT WORK EXAMINED

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 21 Sep 83 p 2

[Article by P. Solozhenkin, academician of the Tajik SSR Academy of Sciences: "The Economic Contract: What Kind of Efficiency Does It Have?"]

> [Text] One important form of link between science and practice is work completed under the terms of economic contracts with enterprises and organizations and aimed at giving them technical aid in mastering leading experience and the achievements of science. In our academy this form of research is being increasingly developed. The academy's scientific establishments annually complete economic contract work worth more than R2.5 million, which is almost three times the amount of scientific research under the terms of economic contracts concluded during the 9th Five-Year Plan. Both the scientific and practical significance of economic contract work has grown, and much of it has acquired a systematic character.

Urgent tasks involving studies in space research, the geological structure, the mineral content of ores and the genesis of mineral deposits, the planning of cities and enterprises and organizations, and improvements in production technology at individual enterprises and plants are all being resolved on the basis of economic contracts. The most efficient farming systems are being developed and introduced, new health care facilities are being set up, and studies are made of the history and culture of the Tajik people from earliest times to the present.

Each year the establishments of the academy propose for introduction 50 or 60 completed developments that are of major national economic significance. In 1982 savings amounting to R2.8 million were realized from the introduction into production of the results of their economic contract work. Ten years ago the figure was only R100,000.

Of course, the effectiveness of work in the different fields of science is not always the same. The most effective work is done by the Institute of Zoology and Parasitology imeni Ye.N. Pavlovskiy. In 1982 the work volume

totaled R137,000 and the savings derived was R1.5 million. A total of R11 was obtained for every ruble spent.

The return from an integrated system used to protect cotton against agricultural pests has been particularly high. According to figures from our academy's Institute of Economics, in addition to the social effect and improvements in environmental protection, the kolkhoz imeni K. Marx and the "50 let SSSR" kolkhoz in Kabodiyechskiy rayon derived R18.24 net income for each ruble spent on introducing this system under the terms of economic contracts in 1980.

A method for protecting the fruit orchards through the use of pheromone lures is being successfully introduced. At farms in Pendzhikentskiy and Samarkandskiy rayons (in the Uzbek SSR) it has been employed over an area of 2,200 hectares. The annual saving from protecting the harvest has been R730,000.

Economic contract work has insured closer links between science and the national economy and accelerated the process of realizing scientific achievements. In general, however, efficiency at a number of our institutes leaves something to be desired. It is essential to increase the return from the completion of orders from enterprises and to wage a struggle against everything that lowers research effectiveness. Improving results means not only and not so much increasing volumes of scientific data and findings as enhancing their significance.

It is far from always that economic contract research culminates in fine, practical recommendations, and because of this the findings cannot be disseminated in general to a sector; and sometimes they lose their national economic implications.

The scientific quest under the terms of economic contracts should be well organized, precisely planned, and provided with the necessary resources in good time. It is essential that it pursues large-scale goals and is oriented on its practical application. Unfortunately, when economic contract work is in the stage of being set up it is not common practice to define the expected savings or social effect. The question arises as to why the establishments entering into a contract do not define beforehand the effect that can be expected at the enterprise. And whether or not it is expedient to carry out work whose effectiveness is unknown.

Acceleration in the rates of scientific and technical progress depends primarily on the successes of the scientific research establishments and their well-organized joint work with the enterprises. Unfortunately, the proportion of economic contract work connected with the plants and enterprises is insignificant. As a rule contracts are concluded with various sector establishments and institutes that recruit our establishments to carry out isolated, partial tasks rather than resolving long-term production tasks of importance for the national economy.

Analysis of the activities of the institutes shows that at most academy establishments the volume of work done under the terms of contracts exceeds the initial (confirmed) plan. Moreover, as a rule, contractual work is done without increasing numbers and it is not accompanied by additional wages fund expenditure. This leads to a situation in which some workers are withdrawn from their direct duties. It is expedient to establish for each establishment, on a scientific basis, an optimal relationship between budgetary and contractual subjects.

The institutes are not always able to withstand the "elemental nature of the economic contracts" and so in some of them the flow of petty orders involving finances of less than R10,000 ovewhelms them. Last year such contracts made up a quite significant part of the economic contracts: 14 percent. It is necessary to enhance the responsibility of leaders for the topicality of subjects, the scientific and technical-economic level of work, and developments on key practical issues facing the country.

The increase in the number of avenues of research under the terms of economic contracts is hampering the formation and development of scientific schools and it does not permit concentration of scientific efforts on reinforcing the theoretica foundations of scientific and technical progress.

The scientific establishments very often show the maximum interest only at the stage of research, while the subsequent stages of the work on introduction do little to rouse their interest. In the academy of sciences, and indeed in the republic as a whole, no system has been established for controlling the process of introduction, and poor use is being made of progressive organizational forms.

A searching evaluation of the scientific and technical level of developments and a critical attitude toward what has been achieved have still not become the rule everywhere. As a result, the state examination boards reject a considerable proportion of the institutes' applications for inventions. In 1982, of all applications made, only 48 percent of technical decisions were recognized as inventions.

A large number of orders are submitted that are oriented primarily on improving existing processes and articles. This promotes the practice whereby each invention is regarded as a unit regardless of its consequentiality. This promotes a certain growth in terms of quantity but not in the effectiveness of the inventive act.

A few words about material incentive for economic contract work. The main indicator for encouraging scientific personnel is the savings derived in production from the introduction of ideas and proposals. As is known, there is a special incentive fund for scientific personnel in the sum of 1.5 percent of the annual savings, held by the client that uses the suggested scientific and technical decisions. As a rule this most important fund for providing bonuses for the executors is absent in the republic's scientific establishments. Have many scientific personnel been awarded bonuses from this fund? Only a few!

The existing structure, planning and management of economic contract work in the republic's scientific establishments require improvement. And contractual work should result in a substantial saving so that for every ruble spent there is an economic or social effect. This should be the concern of all scientists in the republic.

As was noted at the CPSU Central Committee June (1983) Plenum, the scientific establishments must operate on a more current basis and work more actively for a cardinal improvement in labor productivity and the intensive development of the economy.

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NEW ACHIEVEMENTS IN SCIENCE DESCRIBED

Baku VYSHKA in Russian 11 Nov 83 p 2

[Article by A. Kyazimzade: "In the Vanguard of Science"]

[Text] A School for Innovators

The collective of the Baku Geophysical Instruments Testing and Experimental Plant is doing a great deal to incorporate the achievements of scientific and technical progress. New techniques and equipment are assimilated quickly and they provide a rapid return. Under the guidance of experienced mentors, young people readily master innovations.

Recently a group of young scientists from Azerbaijan received the 1983 Komsomol Prize in Science and Technology; included in the group are Delgam Tagiyev, senior scientific associate at the Inorganic and Physical Chemistry Institute of the AzSSR Academy of Sciences; Tamilla Ragimova, junior scientific associate at the Physics Institute of the AzSSR Academy of Sciences; and Pasha Musayev, lecturer at the Azerbaijan Medical Institute imeni N. Narimanov;

Our correspondent interviewed several people about the importance of this work and about the prize winners:

Khudy Mamedov, director of the structural chemistry laboratory at the Inorganic and Physical Chemistry Institute of the AzSSR Academy of Sciences and corresponding member of the AzSSR Academy of Sciences, said:

"Delgam Tagiyev was accepted with unanimous approval for graduate study at the Inorganic and Physical Chemistry Institute of the AzSSR Academy of Sciences; he was sent to Moscow to pursue his graduate work under the guidance of the renowned chemist and academician, Khabib Minachevich Minayev. There he defended his dissertation.

"This prize is a worthy recognition of his work on the complicated problem of creating new zeolite catalysts that are much more selective and effective than previous ones. With their help, fundamentally new chemical reactions can be carried out.

"In other words, Tagiyev, along with other scientists, succeeded in discovering a new direction of science and expanding the front for further research. The results of his work can be of immense scientific and practical importance."

Babek Guseynov, director of the "Registr" [Register] experimental design bureau of the Physics Institute of the AzSSR Academy of Sciences, said:

"Narrow-zone semiconductor compounds of elements from the fourth and fifth groups of D. Mendeleyev's table are of great interest to research scientists. They have distinctive physical properties that can be changed significantly under various conditions. This makes it possible to solve a very important practical problem--obtaining materials with prescribed properties.

"Tamilla Ragimova, an associate of our experimental design bureau, was the first to observe the phenomenon of residual conductivity in narrow-zone semiconductors, and not only to explain this phenomenon, but also to indicate ways to make practical use of it.

"The phenomenon that she discovered is extremely important for further scientific development and for use as a register of very weak radiation which is absorbed and collected as a form of information."

Zakhra Kuliyeva, chief of the Eye Diseases Department of the Azerbaijan State Medical Institute imeni N. Narimanov, honored scientist of the AzSSR, and professor, said:

"At the Eye Diseases All-Union Scientific Research Institute of the USSR Ministry of Health, Pasha Musayev, candidate of medical sciences, developed and incorporated into broad clinical practice new, highly effective surgical methods for treating a number of difficult to treat eye diseases, such as vesicular dystrophy of the cornea and glaucoma. For the first time in the world this talented young scientist proposed that the lens capsule of the human eye be transplanted.

"Pasha Musayev's scientific articles have been published not only in our country, but in England and the FRG. His research results have been discussed repeatedly at international symposia."

Preserving Lumber

An effective composition for protecting lumber from fire and biological damage has been developed at the Azerbaijan Construction Engineering Institute.

Compared to existing methods, this composition provides a high degree of protection and requires a low expenditure of chemicals. Specialists from the institute obtained these indicators by using drilling water as one of the components.

New Launching Method

Specialists at the Marine Petroleum and Gas State Design Institute have developed a new method for launching the base support unit of marine stationary platforms.

This innovation can be used when base support units for deep-water platforms are put together at assembly lots that do not have special launching equipment.

The new method will make it possible to reduce the volume and cost of hydro-engineering operations.

High-Precision Chuck

Scientists at the Petroleum Machine Building All-Union Scientific Research, Planning and Technology Institute have developed a chuck for holding parts such as deep well pump rods.

Equipment of this type usually centers long parts only in one plane, which reduces the precision of processing. In the new model this defect has been eliminated.

Durable Lining Material

Specialists at the Azerbaijan Hydraulic Engineering and Land Reclamation Scientific Research Institute have developed a new composition for mortar. Curved surfaces made of this composition have a higher degree of durability.

This innovation can be used in repair and construction work on the lining of canals, hydaulic engineering structures, and conduits.

New Fire Safety Equipment

Specialists at the Labor Safety Techniques All-Union Scientific Research Institute have developed a new device for preventing the ignition of fuel and extinguishing fuel flowing from a well.

The device is highly effective in extinguishing fires as it breaks up the flow of fuel by using streams of fire extinguishing material.

The innovation is simple in design and is easy to manufacture; its use provides safe working conditions at wells that have broken down.

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BOOK ON MANAGEMENT OF SCIENTIFIC PRODUCTION ASSOCIATIONS REVIEWED

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 10, Nov 83 pp 125-126

[Review by A. Laykkov, candidate of economic sciences, of book "Mekhanizm khozyaystvovaniya v nauchno-proizvodstvennykh ob'yedineniyakh" [The Economic Management Mechanism in Scientific Production Associations] edited by A. A. Markin and Yu. A. Granatkin, Izdatel'stvo LGU, Leningrad, 1982, 184 pages]

[Text] In this particular book, scientific production associations are viewed as a form of uniting science and production that is specific to and inherent only in a planned economy. The book provides substantiation for principles for classifying scientific production associations on the basis of the nature of their final product; the special features involved in combining scientific, technical, and production functions; their industrial importance; their level of management; territorial distribution; and the economic and legal position of their structural units. The books defines in precise terms the special features involved in the economic management mechanism of a scientific production association that are tied to the fact that the association integrates science and production; it performs its functions at all phases of product reproduction; it unites a specialized sector with specialized machine building; it is based on directed, programmed specialization, not thematic or technological specialization; and it is simultaneously an enterprise and a management organ for scientific and technical progress in a subsector. This is what distinguishes a scientific production association from a production association.

In our opinion, the primary contribution made by this book is the complex research on all links of the economic management mechanism of scientific production associations, including the formation of the production structure, organization of management, planning of the "life cycle" of production, economic incentives and the financial credit mechanism, material and technical supply, as well as socialist competition and the management of social processes within the scientific production association.

The monograph presents practical recommendations for defining the length of the scientific production cycle and the effectiveness of models of new technology; for compiling a unified financial plan and balance sheet; for planning consolidated norms for labor-intensiveness in experimental production; and for implementation of a programmed, directed approach and organization of cost accounting in scientific production associations.

A great deal of attention is devoted in the book to the development of indicators for evaluating the work of scientific production associations. Proceeding from a general theory of the effectiveness of socialist production and the special features and tasks of scientific production associations, the book makes a good case for using a basic indicator for evaluating the work of scientific production associations, such as an increase in the rate of scientific and technical progress. More specific indicators are also proposed, such as indicators describing the influence of results of a scientific production association's work on the development of scientific and technical progress in the corresponding industry; the extent to which the scientific and technical potential of an association is utilized; the social and ecological consequences of a scientific production association's activities; and indicators describing the work of an association's production subdivisions.

The authors, however, do not always provide full support for the thematic direction of the research. Several questions of measuring the production efficiency and evaluating the work of enterprises are considered in general terms, but not with regard to the special features of scientific production associations. In a number of cases the tables contain data that do not relate to scientific production associations.

The book indicates ways to turn a scientific production association into a unified scientific production and economic complex. Not enough attention is given, however, to other equally important problems, such as the question of increasing the independence and responsibility of scientific production associations with regard to managing scientific and technical progress in the subsector.

There is no doubt that this work will be of use to people working in scientific production associations and that it will help to make further improvements in their effectiveness.

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SCIENTIFIC, ORGANIZATIONAL ACHIEVEMENTS OF ACADEMICIAN GLUSHKOV LAUDED

Kiev PRAVDA UKRAINY in Russian 24 Aug 83 p 4

[Article by V. Mikhalevich, director of the Ukrainian SSR Academy of Sciences Institute of Cybernetics imeni V.M. Glushkov, academician of the Ukrainian SSR Academy of Sciences: "A Scientist Ahead of His Time"]

> [Text] The date of 24 August 1983 marks the 60th anniversary of the birth of academician Viktor Mikhaylovich Glushkov, an eminent Soviet scientist, Hero of Socialist Labor, Lenin and USSR State Prize laureate, honored scientist of the Ukrainian SSR, and the founder and first director of the Ukrainian SSR Academy of Sciences Institute of Cybernetics, which now bears his name.

When I ask the question what it was that most impressed people about the personality of academician Viktor Mikhaylovich Glushkov, I always get the same answer: a striving toward the future. His main scientific ideas were directed toward the future and he always devoted his intellect and talent to the future. He passionately wanted tomorrow to bring people peace, the joy of personnally organized creative labor and a high state of well-being and culture. And he did everything possible to achieve this.

Viktor Mikhaylovich's last scientific work--"The Bases of Paper-Free Information Science"--which was published posthumously, addressed not only today's readers but also those who will work in the information industry in the next century. The book summed up the as yet unlaid but broad path of cybernetics and computer science and their applications in an enormous number of fields of human activity.

With his profound knowledge of the subject the academician realistically depicts the prospects for the organic intrusion of machine-based, paper-free information science as a truly revolutionary stage in science and technology, comparable if you will with the invention of writing and book printing, for it will mean developing the latest technology to organize all intellectual activity in human society.

Only today's cyberneticist-encyclopedist is capable of embracing the extensive scope of research and practical achievements and on this basis outlining a common goal for specialists in the most varied disciplines of modern science

and technology. And only a person given the gift of prescience could recognize in its entirety the topicality of postulating what seemed to be still remote problems...

V.M. Glushkov was born on 24 August 1923 in Rostov-na-Donu. After graduating in 1948 from the Rostov State University he taught at the Urals Wood Technology Institute. In 1955 he defended his doctoral dissertation, solving one of the most difficult problems in algebra. After a year in Kiev, where he had been invited, he headed a small laboratory of computer mathematics and technology, which thanks to his scientific and organizational activities became the Ukrainian SSR Academy of Sciences Computer Center. Under his leadership there was rapid development in research connected with the design of computers and computer systems.

Viktor Mikhaylovich immediately achieved an organic synthesis of design ideas in the laboratory collective (where the first computer in the country was developed in 1951 under the leadership of academician S.A. Lebedev) with the latest architectural, mathematical and user principles, which V.M. Glushkov formalized and developed as a mathematician and cyberneticist. In a relatively short time the models of Soviet-made computers occupied their proper place among world achievements, and the new cybernetics industry confidently gathered pace.

During the Sixties the inventory of computers was substantially supplemented with medium-sized and small computers put into series production on the basis of models developed by the cyberneticists in Kiev. Right from the very start these innovations in computer technology enjoyed popularity among many Soviet and foreign users. Suffice to to recall the destiny of the "Promin'" and "Mir" computers.

The expansive and revolutionary ideas of V.M. Glushkov touched on the most diverse problems: from the human organism as viewed from the standpoint of cybernetics to the organization of the biological sciences and health care in general, from perfecting the management of an individual production collective to planning and managing the country's economy. The principle that he enunciated on the unity of close and remote goals and the unity of theory and practice formed the basis of the activity that he guided at the institute.

On the initiative of Viktor Mikhaylovich and with his active participation, a computer industry was created in only a few years in the Ukraine--the "Elektromash," "Impul's" and other production associations. Our republic was one of the first to start up production of hundreds of broad-application control machines, computers for engineering calculations and automated production management systems, and machines for designing tests and scientific experiments and processing the results.

The first stages of the republic automated control systems for planning calculations and automated systems for accounts, planning and management, built on the basis of interactive operation between computers, computer centers and automated control systems at the sector and territorial level, were recently commissioned. V.M. Glushkov's many years of activity as the scientific leader

of the republic automated control system and chairman of the council of chief designers can be felt here.

Thanks to the successful resolution of problems concerned with the mass production of computers and their introduction in production, and realization of the ideas on developing automated control systems, the work of the cyberneticists and the work of V.M. Glushkov himself have gained worldwide recognition. And, as one of the most authoritative scientists, Viktor Mikhaylovich was recruited to participate in the resolution of the most complex scientific and technical problems. He was a member of the USSR State Committee for Science and Technology, a member of the USSR Academy of Sciences Mathematics Department, and chairman of and active participant in a number of all-union problem councils and commissions.

For many years Viktor Mikhaylovich was involved with the Program Committee of the International Organization of Data Processing and headed the UN Commission of Experts of Computers. His participation in international developments was officially recognized by the governments of the GDR and Bulgaria, and he was elected as a foreign member of the academies of sciences of the GDR, Bulgaria and Poland and a full member of the "Leopoldine" International Academy, and was awarded an honorary doctorate from the Dresden Technical University (GDR). He was scientific consultant to the government of Bulgaria for the introduction of automated control systems in the national economy.

It is significant that V.M. Glushkov himself considered that for him the most difficult thing was to be both a scientist and organizer, and he recognized the need to have this special gift. And although the scientist was paramount in his life, he brilliantly combined science with organizational activity. The best proof of that is the Institute of Cybernetics, which grew out of a small laboratory in one of the country's leading scientific and technical complexes, and where today about 6,000 scientists and specialists work, including dozens of doctors and candidates of science, many of whom are former students of Viktor Mikhaylovich and who are continuing his life's work.

This scientist was distinguished by his statesmanlike approach to problem solving. It was therefore not fortuitous that he was elected as a deputy of the USSR Supreme Soviet for several of its convocations, a member of the Ukrainian Communist Party Central Committee, and a member of the Ukrainian Communist Party Kiev obkom. A number of timely proposals that he put forward as draft decisions were reflected in the most important documents of the 24th, 25th and 26th CPSU congresses.

A passionate and tireless propagandist, Viktor Mikhaylovich used constantly to lecture on his ideas and thoughts, wanting as many people as possible to become acquainted with the cause in which he believed with reservation. V.M. Glushkov saw in the broad development of automated control and extending the opportunities for man's direct and creative interaction with cybernetic devices not only one of the pivotal directions of the scientific and technical revolution but also a most important factor of social progress.

All those who knew this scientist remarked that his normal condition was one of constant creative work and tense thought. Even when he was ill or away on vacation he wrote monographs and articles and considered proposals. Hours on an aircraft or travelling were not empty hours for him. He never had enough time. But he nevertheless defined time. For many years, for decades.

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